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NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

MBA PROFESSIONAL REPORT

**A Comparative Analysis of Key Business Community Characteristics of
Weapon System Sustainment Programs and Implications for Future
Weapon System Programs**

**By: Juan M. Marshall
Robert H. Paleo
James M. Cohn
December 2005**

**Advisors: Rene Rendon
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**A COMPARATIVE ANALYSIS OF KEY BUSINESS COMMUNITY
CHARACTERISTICS OF WEAPON SYSTEM SUSTAINMENT PROGRAMS
AND IMPLICATIONS FOR FUTURE WEAPON SYSTEM PROGRAMS**

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Submitted in partial fulfillment of the requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

from the

**NAVAL POSTGRADUATE SCHOOL
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A COMPARATIVE ANALYSIS OF KEY BUSINESS COMMUNITY CHARACTERISTICS OF WEAPON SYSTEM SUSTAINMENT PROGRAMS AND IMPLICATIONS FOR FUTURE WEAPON SYSTEM PROGRAMS

ABSTRACT

The operation and support phase of a major weapon system is one of the most costly phases in the life cycle of a program. During this phase, the key stakeholders must build a long-term sustainment strategy to make sure the program is affordable, and that the weapon system is reliable and maintainable. The ultimate objective in this effort is to ensure all support providers, either organic or contractor, have mission readiness, translated into warfighter capability, as their long-term overarching priority. To this end, the business community (financial management and contracting) must develop a strategy that complements and satisfies the warfighters objective(s). The purpose of this research project was to examine critical sustainment program characteristics from a business community perspective for applicability in future weapon system sustainment efforts. The characteristics were identified to fall within three broad categories: (1) Reporting Mechanisms (developing and controlling the requirement); (2) Financial Management Perspective (understanding the funding process); and Contracting Perspective (arranging for the requirement). Using the Sustainment Business Model, the research team conducted a comparative analysis of two programs: The F-16 Falcon and C-17 Globemaster. The research concluded with the identification of good practices and suggested recommendations.

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I. INTRODUCTION

A. BACKGROUND

All weapon systems pass through a series of acquisition phases as they progress from an initial concept development phase to that of an operationally fielded system requiring long-term sustainment (Figure 1). One aspect of the long-term sustainment that a System Program Office (SPO) must contend with during the initial fielding of the system and going into the long-term sustainment phase is how to manage and integrate all the different components that come together to sustain the weapon system. Many decisions must be made during the early stages of the acquisition process that will have long-term affordability, reliability and maintainability implications throughout the life of the weapon system.

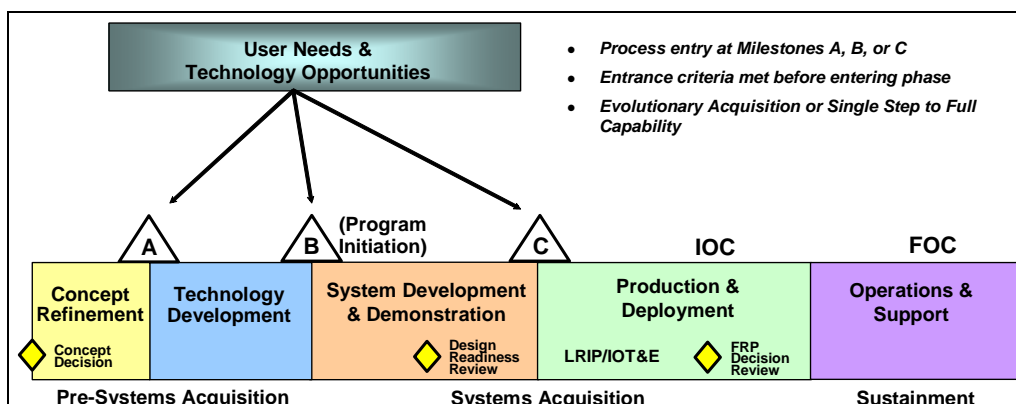


Figure 1. The Defense Acquisition Management Framework.

In general terms, the Department of Defense (DoD) defines the Operation and Support phase for a weapon system as follows:¹

The objective of this activity is the execution of a support program that meets operational support performance requirements and sustains the system in the most cost-effective manner over its total life cycle. When the system has reached the end of its useful life, it shall be disposed of in an

¹ Department of Defense Instruction 5000.2. *Operation of the Defense Acquisition System*. 2003.

appropriate manner. Operations and Support has two major efforts: Sustainment and Disposal.

In the Operation and Support phase of the weapon system life cycle, DODI 5000.2 points out the “purpose of the Sustainment effort is to execute the support program to meet operational support performance requirements and sustain the system in the most cost effective manner over its life cycle. Sustainment includes supply, maintenance, transportation, sustaining engineering, data management, Configuration Management (CM), manpower, personnel, and training”². This phase overlaps and follows the Production and Deployment phase which includes Full Rate Production (FRP). According to CJCSI 3170.01C, the ultimate objective of the Operation and Support phase is to provide the personnel, logistic and other support needed to deliver prolonged combat operations to meet national objectives.

As a program transitions from the Production and Deployment Phase to the Operation and Support Phase, the system program office must develop the best long-term sustainment strategy to use, which means having to make trade-off decisions on the most cost effective support approach, changing the approach as necessary to fit the political and economic climate at the time. With assistance from the end user and supporting commands, the program office makes enterprise-wide programmatic and planning decisions on maintenance and repair workloads for all subsystems and major components and on the best way forward in managing the supply chain. Stemming from the enterprise-wide sustainment strategy will be a host of functional level processes that will support and implement the overarching strategy.

B. PURPOSE

As any program passes through initial operating capability to full sustainment, transitioning into the last major, and arguably most costly, stage of the weapon system life cycle, many functional level processes will take place to ensure the sustainment program is realistic and affordable, and delivers the desired output. The objective of this research project is to examine critical sustainment program characteristics from a

² Defense Acquisition University Online Glossary, <http://akss.dau.mil/jsp/Glossary.jsp> Nov. 2005.

business community perspective for applicability in future weapon system sustainment efforts. For this research effort, the business community is defined as the financial management and contracting functional communities. The primary purpose of the research project is to identify the critical business community processes that are necessary to ensure successful implementation of a long-term sustainment strategy.

C. SCOPE AND ORGANIZATION

Sustainment of a major weapon system is a broad and complex effort, dealing with multi-million dollar deals and a myriad of contractor and organic support providers. For this research project, the team members will examine, using a sustainment-focused business model, the business strategies used by the F-16 and C-17 weapon systems in sustaining their particular platforms. The scope of this research project is to provide an examination of critical business community success factors. In this report, the team will provide an informed foundation (literature review) on factors critical to the business community in support of a long-term sustainment program for a major weapon system. From the concepts identified in the literature review research, the project team will generate a business model for determining the best business-related factors to consider for a long-term sustainment strategy. This business model will be used to analyze the approach two major weapons systems have taken towards long-term sustainment of their respective weapon system platforms. The two major weapon systems are broken down into a mature system (the F-16 Falcon) and a more recently fielded weapon system (the C-17 Globemaster). The two weapon systems were chosen to contrast the different sustainment approaches taken by a mature versus an emergent weapon system.

The literature review will center on three areas that the project team has deemed critical for a business community approach to long-term sustainment strategy. The three areas are based on a similar approach taken in a recent RAND study ³ that considers critical success factors for any weapon system. The three critical areas for this project are:

³ Johnson, Robert V. and Birkler, John. *Three Programs and Ten Criteria*. RAND, 1996.

(1) Reporting Mechanisms--developing the requirement and controlling the process

(2) Financial Management Perspective--understanding the funding process

(3) Contracting Perspective--arranging for the requirement/capability

These three areas will not only serve as a basis for the literature review, but also provide a framework for building the business model. The goal is to identify the relationships between key business community sustainment characteristics that are necessary for successful implementation of a long-term sustainment strategy. The business model will then be used in a case study of the two major weapon systems to provide a descriptive analysis of each program's approach to sustainment from a business community perspective. Using the model, the team will identify, discuss and classify similarities and differences between the three selected weapon systems for their particular stage in the sustainment process. The team will analyze areas considered as good practices, and provide lessons learned for areas that may need further management attention. The project will conclude by providing a recommendation on business community strategies for long-term sustainment.

D. METHODOLOGY AND RESEARCH PROCEDURES

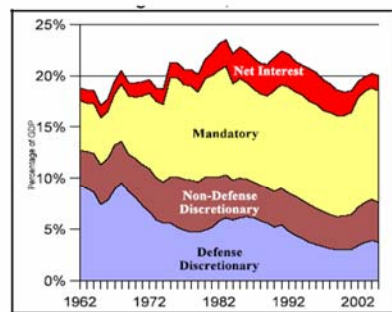
The graduate project team will use traditional research method and procedures to gather data related to the topic. In providing an informed foundation on the different business community sustainment criteria, the team members will gather data from trade journals, on-line media sources and directly from source documents from different SPOs.

For the descriptive analysis of the two selected weapon systems, the research team will obtain and analyze source documents from the respective System Program Offices (SPOs), and as necessary, conduct informal interviews with key personnel from each SPO.

II. LITERATURE REVIEW

A. DEALING WITH FISCAL ENVIRONMENT CONSTRAINTS

Before proceeding with the specifics of the business community approach in the sustainment phase, it is helpful to first start with a macroeconomic snapshot of the Federal fiscal environment (Figure 2). As anyone who works in the current fiscal environment knows, whether it is in the DoD or other Federal agency, it is economically infeasible for Congress to fund all the requirement requests from all the different Federal departments and agencies. The Federal tax revenue cannot sustain all requirements and growing the Federal Debt to fully fund them is not the answer. To make matters worse, as baby boomers reach the Social Security retirement age and as Medicare costs skyrocket, spending for mandatory (statutory) requirements will continue to increase over the coming years, and will compete against discretionary funds used by other governmental agencies, the DoD being one primary user of this type of funding source.



Source: Office of Management and Budget, *Budget of the United States Government, Fiscal Year 2005: Historical Tables*, February 2004, [<http://www.whitehouse.gov/omb/budget/fy2005/hist.pdf>], p. 128.

Figure 2. Federal Spending by Category.

This strained fiscal environment will have drastic implications for DoD and the USAF. It sends a signal that in the coming years the department must be more efficient and effective in spending and controlling its allocated discretionary funds. When it comes to operations and support, it means the end-users (the warfighters) will have to rely on the government business community to aid them in making difficult trade-off decisions, where they will have to look at balancing readiness against the available resources, in the process making difficult prioritization decisions on sustainment requirements. The government business community has provided this kind of support all along, but the business approach will take on a new twist as the fiscal environment becomes more strained and competitive. The government business community will need to take a more proactive approach to doing business to ensure the outputs are providing relevant, accurate and timely information and tools to the decision maker(s).

Exacerbating matters for the USAF are the aging of the aircraft fleet with an average fleet age of nearly 24 years, the cost growth attributed to state-of-the-art replacement weapon systems that are costing exponentially more than legacy systems to manufacture and maintain, and the dramatic increase in the operations tempo (Figure 3).

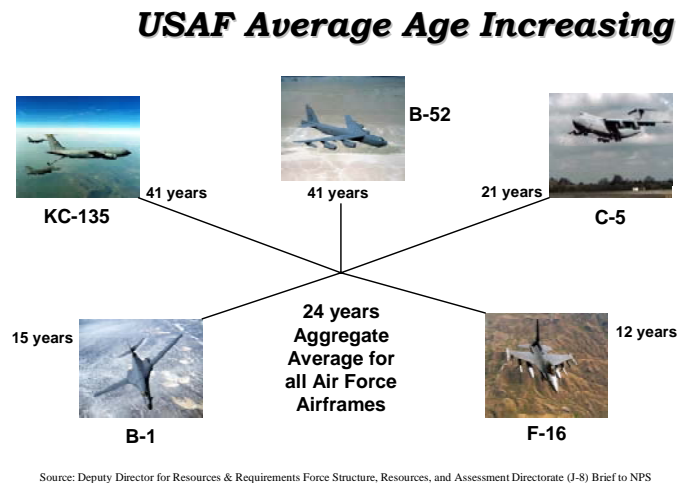
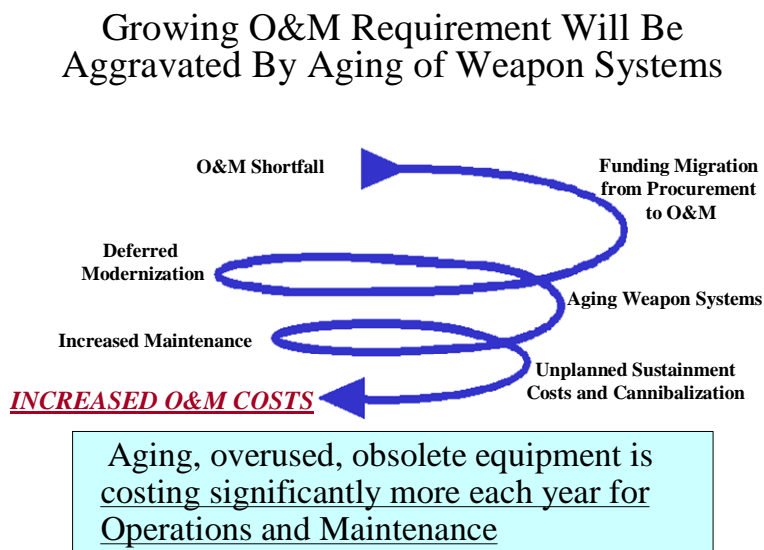


Figure 3. Average Age of Aircraft Increasing.

While the replacement systems are driving up costs in the Research, Development, Test and Evaluation (RDT&E) and Procurement appropriations, the aging

fleet, more complex systems and the high operations tempo are driving up costs in the Operation and Maintenance (O&M) appropriation. The aging platforms will require more maintenance and repair to keep the systems at a mission capable and availability rate that will meet operational readiness requirements. As systems become more complex, it is becoming more costly to maintain and support them, especially for those weapon systems that treated sustainment as a secondary design consideration. In summary, these factors are throwing the USAF into an escalating O&M cost spiral (Figure 4). So what should be done to fix the problem?



Source: Deputy Director for Resources & Requirements Force Structure, Resources, and Assessment Directorate (J-8) Brief to NPS

Figure 4. Growing Operations and Maintenance Requirement.

The USAF has responded to the threat to its discretionary funding by transforming business processes. One response has been to improve the acquisition process by using the concept of spiral development to speed up the development, procurement and fielding of weapon systems. A second response has been to align the acquisition system centers under a wing-like organizational construct to improve lines of authority and control for similar weapon systems, and to incorporate logisticians into all phases of weapon system life cycle. Another response has been to improve the way we sustain the current inventory. The logistic community has taken the lead in this transformational effort under its Expeditionary Logistics for the 21st Century (eLog21).

Initiative eLog21 emphasizes a more strategic sustainment approach. This will require a collaborative approach with other functional communities, using Performance-Based Logistics (PBL) and Enterprise Resource Planning (ERP). Yet another approach taken by DoD and the USAF is to eliminate excess capacity under the Base Realignment and Closure (BRAC) process, realigning resources to minimize duplication of effort and eliminating unnecessary facilities.

On the financial management front, over the past decade, DoD and the Services have been emphasizing the importance of Reduction in Total Ownership Cost (R-TOC) and Cost as an Independent Variable (CAIV). Under these financial concepts, more emphasis has been placed on using the cost estimate as a basis for making trade-off determinations between the delivery schedules and performance requirements. Of course, in making any trade-off decisions, the users will have to assess the level of risk they are willing to accept and then make determinations on the best way to deal with that risk. One primary reason for accurately capturing the sustainment requirement, a reason that ties in with the restrictive fiscal environment, is the high cost associated with this phase of the Life Cycle Cost. This phase of the weapon system life cycle typically consumes as much as 65% of the TOC, and is spent over years if not decades (Figure 5). When dealing with costs comprising approximately 65% of a multi-billion dollar program, spread out over a number of fiscal years, it is imperative that the costs be accurately calculated and distributed to match the requirement.

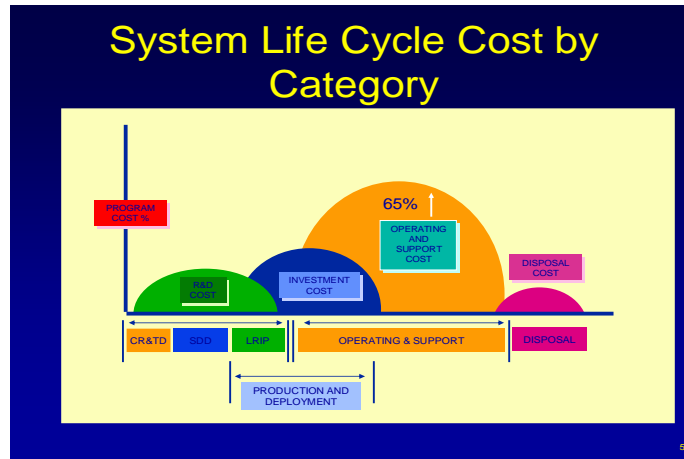


Figure 5. System Life Cycle Cost by Category (Source: MN3331 Course: Principles of Systems Acquisition and Program Management, 2004).

Starting off with an overview of the fiscal environment provides a framework for understanding of how funding constraints indirectly impact on all aspects of the operation and support phase, and lays the foundation for understanding how the requirement, funding and contracting processes are inextricably linked. Additionally, having an understanding of the inherent instability of the funding process gives a better appreciation for how critical it is to accurately capture the costs for a requirement, then budget for that requirement and ultimately execute contracts or support agreements that will deliver the desired performance. More importantly, if the level of funding changes, which inevitably it will, having a thorough understanding of the requirement and funding processes provides a framework for determining how changes will eventually impact on the most important output of the process which is the readiness level of the force.

B. REPORTING MECHANISMS

Not only must the government business community deal with fiscal constraints, it must also deal with other key processes. An important aspect of the operation and support phase of a weapon system life cycle that must be understood by the government business community is the requirement generation process. To support the requirement generation process, the government business community must either thoroughly understand the technical aspects of the sustainment requirement or have access to the experts that do and understand the part they play in funding and procuring that requirement. Sustainment

requirements, emerging as an indirect byproduct of the logistic and readiness measures, and support requirements in the Mission Need Statement (MNS) and the Joint Capabilities Integration and Development System (JCIDS) process, cover a broad range of categories, but for the purpose of this research project, the discussion will center on requirements in general terms as it relates to maintenance and repair of systems and subsystems, and all the necessary spare parts, consumables and equipment needed to support and sustain a weapon system.

As previously mentioned in the Introduction, sustainment covers a broad range of categories, including but not limited to supply, maintenance, transportation, sustaining engineering, data management, manpower, personnel, training, information technology (IT), and supportability and interoperability functions⁴. Management of these sustainment categories starts taking shape in the concept exploration phase, continue to develop in the acquisition phase and takes a more definitive form in the operation and support phase. The program manager (PM) initially has responsibility for sustainment planning during which the PM will work closely with the end-user Major Command (MAJCOM). Once the weapon system reaches initial operating capability (IOC), the gaining MAJCOM and appropriate Air Logistic Center (ALC) will take on a more robust role in managing the sustainment program. This section will look at identifying requirements, control mechanisms, stakeholders, and the stakeholder link to the control process.

1. Identifying Requirements

The most difficult part of determining the support needed for a weapon system is to first define the sustainment requirement during the early system acquisition phases. At this critical junction, where operation and support life cycle costs are determined, the logistic community must work closely with the system engineering community to consider supportability as part of the design factor. Placing logisticians in system program offices (SPOs) to incorporate supportability concepts early-on in the design and

⁴ Department of Defense Instruction, 5000.2. *Operation of the Defense Acquisition System*. 2003.

into the acquisition phase is one way to reduce the cost and performance risk in the operation and support phase of the life cycle which has been done for years.

In the early phases of the weapon system, defining long-term sustainment is an elusive task, but takes shape as the system enters the operational phase and reaches maturity. As the book *Visualizing Project Management* points out, requirements generally start with the needs of the operational user⁵--in the case of DoD that would be the “warfighter”--and ends when the needs of the user are ultimately satisfied. When it comes to the sustainment requirements of a complex weapon system, extending over decades for some legacy systems, the requirements are extensive, continuous, widely dispersed and often indirectly linked to the ultimate goal (readiness levels).

Part of identifying and controlling the sustainment requirement is building a comprehensive maintenance plan that addresses a number of critical factors. One factor addressed in the plan is the support requirements needed to maintain an operational capability at an affordable cost. This approach should consider the repair times, repair locations, level of maintenance concept (base, intermediate or depot-level), preventive maintenance, reliability and maintainability, transportability and mobility of the weapon system and support equipment. Another critical factor is to determine the organic and contractor workload mix. One other factor to consider is the use of pre-operational support (Interim Contractor Support) and post-operational support (Contractor Logistic Support). This includes support in the form of spares, technical orders, support equipment, facilities, training, site activation, support planning, system engineering and other support-related cost elements.

The challenge comes not only in planning for and clearly defining the requirement in the first place, but also in controlling sustainment requirements to keep the weapon system at the highest possible mission capable or aircraft available rate. Any misunderstanding between the user and provider of the support will negatively impact on the support provided. To deal with this inherent risk, each level of support from the SPO to the ALC institutes a process for defining and controlling sustainment requirements.

⁵ Forsberg, Kevin. *Visualizing Project Management*. 2000.

According to DoD acquisition regulations, the program manager is assigned the responsibility of working with the end users to document performance and support requirements, considering in the process the objectives, outcomes, measures of performance, the resources to commit and the stakeholders' responsibilities. The program manager is also responsible for initiating any system modifications that will improve weapon system performance and reduce total life cycle ownership costs. Transformations in the logistic community have placed an emphasis on MAJCOMs taking a more proactive role in defining and prioritizing the requirements⁶ since they will ultimately be the bill payers for long-term sustainment efforts. The primary document used in detailing the sustainment approach is the Life Cycle Management Plan (LCMP), formerly known as the Single Acquisition Management Plan (SAMP) and/or the Product Support Management Plan (PSMP). The primary purpose behind the LCMP is to provide a living document that plans a "cradle to grave" approach, combining both the acquisition and sustainment concepts, and eliminating redundancy and conflicting guidance from having two separate documents. From the sustainment perspective, the document is refined as the system matures and/or as it changes to meet evolving operational requirements. It also lays the groundwork for transitioning program management sustainment responsibility from the Program Executive Officer (PEO) to the Air Logistic Center (ALC).

Over the past decade, all key stakeholders, from elected officials to the defense industry, have pushed for streamlining the acquisition process by speeding the development and procurement cycle, reducing total ownership costs (R-TOC) and improving reliability and maintainability. On the operation and support side, the impetus of late in the Department of Defense (DoD) has been to link support to a capability. Under this concept, requirements are linked to end user-defined capabilities that are documented in JCIDS. The USAF has recently published AFI 63-101- *Operations of Capabilities Based Acquisition System* to implement this DoD 5000.2 requirement. The "support as a capability" concept is focused on reducing cycle time and improving

⁶ HQ USAF/ILI. White Paper on "*Future Financials - More Combat Capability for the Dollar Spent*," September 2004.

program credibility, but the end goal is to deliver better combat capabilities to the warfighter.

2. Control Mechanisms

Once the requirement in the form of a capability has been defined, the next step is to determine the best way to measure performance. Performance-based logistics is the DoD preferred methodology to measure the support provider's performance in meeting the requirement.⁷ The metrics that are used to keep score must be delineated in the logistical support contract if the capability is provided by a defense contractor or documented in support agreements if the capability is provided by an organic (government) provider. Of course, the next logical step is to monitor the metrics on a continuing basis to determine whether the performance delivered is achieving the goal, a step which the GAO has accused the DoD of not addressing⁸.

Over the past decade, due to tight discretionary funding available to DoD and the excess utilization capacity in both the DoD and in the commercial sector, there has also been a push towards having defense contractors take on a more active role in providing for long-term sustainment of weapon systems, under the assumption that they have commercial business models that will improve performance and reduce ownership costs. Under Contractor Logistic Support (CLS), as the contractors' role changes to take on more responsibility for sustainment so too has the contractual arrangements. The concepts of requirement ownership have emerged in the form of Total System Support Responsibility (TSSR), Total System Support Integration (TSSI) and Total System Performance Responsibility (TSPR).

Taking the sustainment requirement concept one step closer to the operational support level, as the weapon system nears the deployment phase, the program manager must make decisions on the best approach to take in supporting the fielded weapon system. The SPO will use the Source of Repair of Assignment Process (SORAP) to

⁷ AFI 63-101 *Operations of Capabilities Based Acquisition System*, Paragraph 5.2.2.16.

⁸ Government Accountability Office. *Defense Management: DOD Needs to Demonstrate That Performance-Based Logistic Contracts are Achieving Expected Benefits (GAO-05-966)*. Sep. 2005.

allocate organic and commercial depot workload and other decision-making processes for making supply chain management assignments. In making determinations on the source assignment, AF Corporate stakeholders are involved in making the final decisions. The allocation of sustainment support, including maintenance/repair/overhaul workload, and supply chain management can take different avenues. The contractor tends to heavily influence the determination process by the way support is structured in ICS arrangements, but consideration must be given to the plethora of public laws that place restrictions and guidance on the workflow requirements.

Influencing the source assignment process are several public laws. The overarching guidance for depot maintenance falls under the Title 10 USC 2464- *Definition of Depot-Level Maintenance and Repair* umbrella. From this title comes a series of other sections: Title 10 USC 2464- *Core Logistics Capability*, which states each military department must maintain organic depot maintenance capability; Title 10 USC 2466- *Limitations on the Performance of Depot-Level Maintenance of Material*, which states each military department must maintain an annual dollar ceiling of no more than 50% contract depot maintenance; Title 10 USC 2469- *Contracts to perform workloads previously performed by depot-level activities of the Department of Defense: requirement of competition*, which covers workload shifts of greater than \$3 million that must be competitively sourced on a merit-based selection process; and Title 10 USC 2474- *Centers of Industrial and Technical Excellence: Designation; Public-Private Partnerships*, which calls for a best value depot maintenance and repair approach. To ensure internal compliance with these public laws, the USAF has implemented AFI 63-107- *Integrated Product Support Planning and Assessment* as guidance in drafting a sustainment strategy, placing primary responsibility in the hands of the Program Manager.

Within the DoD, project management of any aircraft sustainment program is a critical operation that involves numerous stakeholders and processes, all focusing on defining requirements, allocating scarce resources and executing the plan. The process of transforming product support requirements into sufficient funding is a multi-step process. Failure of stakeholders to communicate effectively at any point in the process can

jeopardize the funding for the operation and support requirements which will ultimately impact the mission capable rates and the overall mission. Therefore, as each stakeholder role is identified, the respective control mechanisms will also be acknowledged to include key success factors and good practices.

Since there is a distinct separation between requirements and funding authority processes, early and continual collaboration and communication among stakeholders is vital to adequately fund product support. The cornerstone for success is a true teaming relationship with industry partners, internal Air Force functionals, and other government stakeholders involved in the acquisition system framework.⁹ Although regulatory guidance outlines specific control mechanisms at most levels of responsibility, required control mechanisms are more specific for the stakeholders at the Major Command (MAJCOM) and higher level. Each stakeholder in the sustainment process has their own objectives and responsibilities. Regardless to whether these objectives and responsibilities are required by law or regulation, are of a business nature or personal preference, tied to politics or not, they affect the ultimate outcome of every acquisition phase. Hence, it is vital for each stakeholder to have control processes and mechanisms in place and for them to encourage open communication in order to gauge each process of their respective activities to ensure each is successfully accomplished. As the book *Performance Measurement & Control Systems for Implementing Strategy* points out, managers use formal, information-based procedures and routines to maintain or change patterns in organizational activities.¹⁰ The author goes on to say:

Performance measurement and control information can be understood only by reference to some model of underlying organization process. In other words, managers must understand the process by which inputs are converted into outputs (Figure 6).¹¹

⁹ AFI 63-101 *Operations of Capabilities Based Acquisition System*.

¹⁰ Robert Simons. *Performance Measurement & Control Systems for Implementing Strategy*. New Jersey: Prentice-Hall. 2000. Chapter 1, page 4.

¹¹ Robert Simons. *Performance Measurement & Control Systems for Implementing Strategy*, (New Jersey: Prentice-Hall, 2000) Chapter 4, page 59.

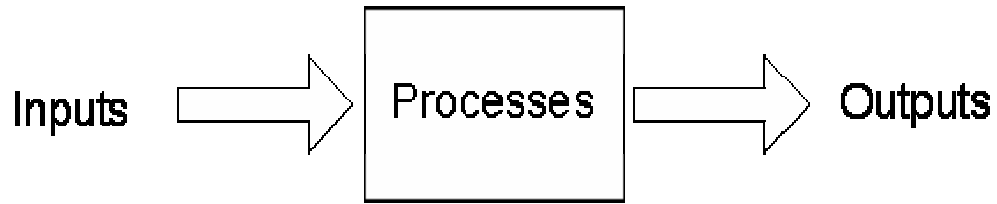


Figure 6. Inputs, Process, Outputs Model.

In DoD’s case, the output should be matched with achieving sustainment goals such as efficient product support and adequate funding for mission success. From a DoD perspective, narrowed specifically to the sustainment topic, the **inputs** include everything needed to provide product support; information, personnel, funding, contracts, labor, support product or service, etc. The **process** includes transforming all the inputs into a product or service for the end-user. Finally, the **output** is product support for sustainment; more specifically, the desired outcome is a high level of readiness. But a manager cannot merely understand these three factors and expect to measure or change a process. Two additional factors must be included in the model; a standard or benchmark to compare against actual performance and a feedback channel to communicate variances so action can be taken. When combined the “inputs, process, outputs” model, it is referred to as the Cybernetic Feedback Model as illustrated below (Figure 7).¹²

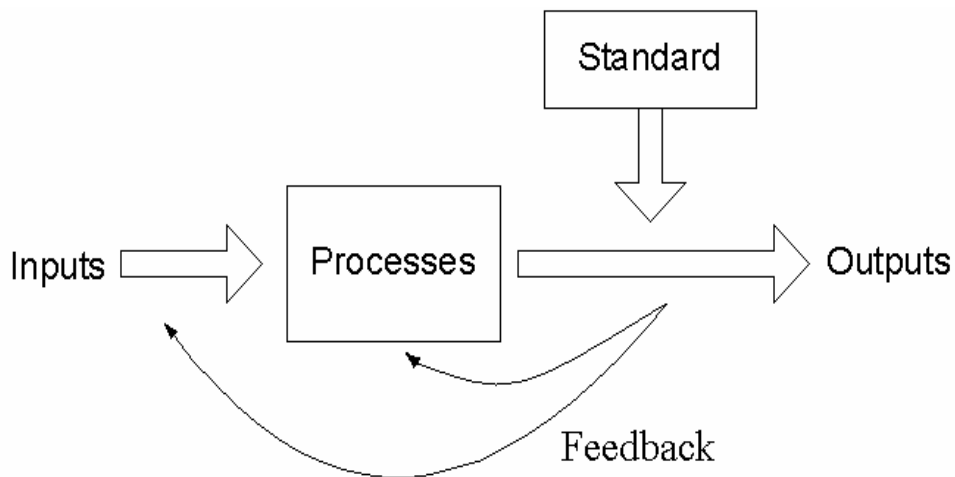


Figure 7. Cybernetic Feedback Model.

¹² Robert Simons. *Performance Measurement & Control Systems for Implementing Strategy*, (New Jersey: Prentice-Hall, 2000) Chapter 4, page 61.

Using this type of model, managers can then gather information and choose among the three categories (inputs, process, and output) to determine *where* he or she will devote attention to ensure that outputs are matched to the overall strategy. Later in this section, the Cybernetic Feedback Model will be used as a basis for analyzing the reporting and control mechanisms.

3. Stakeholders

Returning our focus to the stakeholders, key players in the sustainment process consist of Congress, the President, the Office of Management and Budget, contractors, Combatant Commanders, the Air Staff, MAJCOMs, and the operational end-users. However, the main focus of this discussion will be concentrated on the Air Force Corporate Structure that implements the PPBE system, the Aeronautical Systems Center (ASC), Air Logistics Centers (ALCs), and Program Managers that provide logistical support a.k.a. Product Support. MAJCOMs make up the main decision-making body for sustainment program requirements.

The MAJCOM responsible for Air Force aircraft sustainment programs is the Air Force Material Command (AFMC). AFMC logistically supports every weapons system through the use of ASC Product Centers that are responsible for research, development, test, evaluation and initial acquisition of aeronautical systems and related equipment for the Air Force, and ALCs that provide logistics support for the entire Air Force aircraft inventory.¹³ Although Air Force aircraft sustainment programs are managed by the ASC Wing at Wright-Patterson Air Force Base, Ohio, there are numerous key stakeholders outside ASC that play a vital role, affect, and therefore have a vested interest in the process. Within the DoD, the stakeholders other than ASC in the sustainment decision-making process include everyone from the Air Staff to MAJCOMs that funnel funding to ASC and ultimately the appropriate SPO for product support, to Combatant Commanders that utilize various MAJCOM assets (aircraft, pilots, maintenance personnel and support equipment).

¹³ Retrieved from <http://www.usaf.com/orgs/5.htm> Oct. 2005.

According to the Weapon Systems Intelligence Integration (WSII) Handbook, the Air Staff is at the top of the approval list for Air Force requirements:

Under supervision of the Chief of Staff of the Air Force (CSAF), the Air Staff serves as the military staff of the Secretary of the Air Force (SAF) and is responsible for the efficiency and operational readiness of the Air Force. The Air Staff organization is primarily concerned with, and plays a vital role in providing resources to the Air Force Major Commands (MAJCOM); ensuring that operational forces are properly trained, equipped, and maintained; and providing overall guidance and support to the operating commands. The Air Staff is the focal point for the documentation, coordination, and oversight of requirements within the Air Force. **All weapon system requirements for Air Force MAJCOMs are coordinated, evaluated, and approved by the Air Staff.**¹⁴

However, the Planning, Programming, Budgeting and Execution process is actually implemented using a unique process called the Air Force Corporate Structure (AFCS). Per AFI 16-501, Control and Documentation of Air Force Programs, the goal of the AF PPBE process is to achieve the defense objectives established by the President and the SECDEF in the DPG. DoD Directive 7045.14 states the Heads of DoD Components are responsible for developing and executing programs and managing resources, and achieving national security objectives and requirements. Though not specifically mandated by OSD, the AFCS has served as the means through which the AF fulfills this responsibility in the planning, programming and budgeting phases of the PPBE. The benefits of the AFCS increases management effectiveness by applying judgment and experience to programs, resource limitations, and other program adjustments while balancing competing goals and matching the limited resources where they are desperately needed.¹⁵ Air Force Instruction 16-501, Control and Documentation of Air Force Programs, defines the Air Force Corporate Structure (AFCS) as the corporate review process for HQ USAF. The primary objective of this forum is to provide an avenue for cross-functional decision making. The AFCS membership is

¹⁴ *Weapon Systems Intelligence Integration (WSII) Handbook*; June 1999, Chapter 5, paragraph 5.1 The Air Staff, retrieved from <http://www.fas.org/irp/doddir/usaf/wsii/037GZ005DOC.htm> Oct. 2005.

¹⁵ AFI 16-501 *Control and Documentation of Air Force Programs*. Paragraph 2, page 2. Aug. 1999.

actually broken down into four distinct levels: the Air Force Council, Air Force Board, Air Force Group, and Mission/Mission Support Panels. The AFCS is a centralized corporate body, internally regulated and subject to reconfiguration based on the chairperson at each level. When using the term “corporate,” the Air Force is referring to themselves as a unified organization, not as a business corporation. Once a “corporate” decision has been made, the decision becomes the official AF position.

As the DoD Directive 7045.14 states, “the ultimate objective of the DoD PPBS [PPBE] shall be to provide the operational commanders-in-chief the best mix of forces, equipment and support attainable within fiscal constraints.” The PPBE system essentially provides a means for senior leadership of a component or service to make resource allocation determinations to best meet this objective. Therefore, it is crucial for the lower levels of management to aptly translate MAJCOM requirements into cost estimates to have any hope of correctly funding those requirements.

In the planning phase, AF Planners (AF/XPP) will use the Defense Planning Guidance (DPG) to produce AF specific planning and programming guidance, such as AF Vision 2020, AF Capability Investment Strategy (AFCIS) and the Annual Planning and Programming Guidance (APPG). The purpose of these documents is to provide a basis for programmers to convert threats into effects-based capabilities. All planning documents are reviewed by the AFCS, with final approval by the SECAF and CSAF.

In the programming phase, the AF Programmers (AF/XPP) will create an effects-based program in the Future Years Defense Program (FYDP) to meet the capabilities, mission and objectives as stated in the specific AF planning guidance. The programming phase is the point in the process when the Office of the Secretary of Defense (OSD) conducts an initial program review, and subsequently issues Program Decision Memoranda (PDMs) to make changes to the programs. For this phase, the AFCS is responsible for matching available resources against valid requirements to create a balanced AF program for the FYDP. During the latter part of this phase, the AF Deputy Chief of Staff (DCS) for Plan and Programs (AF/XP) will work with OSD/PA&E on matters affecting the AF POM. This typically results in additional Program Decision Memorandas (PDMs), which typically require offsets within the AF budget.

The budgeting phase follows the planning and programming phases, and is when SAF/FMB takes on more of a leadership role in the AFCS. The AF budget developed in this phase will be evaluated jointly by OMB (Office of Management and Budget) and Office of Secretary of Defense (Comptroller) (OSD/C). Any changes in the Budget Review (BR) will be issued in the form of Program Budget Decisions (PBDs). Since the final product from this phase will eventually become the Air Force's portion of the President's Budget, the AFCS becomes heavily involved in reviewing PBDs and evaluating the impacts from recommended offsets.

Major Commands (MAJCOMs- e.g., Air Combat Command, Air Mobility Command and USAF in Europe), Headquarters Air Force (HAF) functionals, Direct Reporting Units and Field Operating Agencies also interact with the AFCS during the development of the POM and BES, and throughout the year on other resource-related issues. During the POM and BES cycles, PPBE issues brought forward by agencies and departments primarily enter the process via mission/mission support panels. On a case-by-case basis, issues may bypass the panels, entering the AFCS by way of functional communities and ad hoc Integrated Process Teams (IPTs). These issues enter the AFCS at various levels, depending on the importance of the matter, and at the discretion of the AF/CV.

The logistic requirements to support fielded items in the sustainment phase ultimately have to come from the MAJCOMs that utilize and manage the assets. They must communicate those needs clearly to the respective PM that oversee the budget building process for funding the requirements. The financial cost estimate forwarded through this process is known as the FINPLAN. Controlling the logistic requirements process is critical to ensuring reliable systems and valuable support to the warfighter and as indicated, involves not only the Combatant Commanders, but the MAJCOMS as well. At the PM level, also reporting to the AFCS, are Program Element Monitor (PEM) teams who are responsible for specific programs within the AF (e.g. one PEM is responsible for a single weapon system like the F/A-22). Along with PEMs at the PM level, Concept of Operations (CONOPS) Champions are teams who are responsible for specific effects-

based capabilities. At the PM level, these PEMs translate MAJCOM requirements into cost estimates that ultimately will be included in the BES.

4. Stakeholder Link to Control Process

Linking the stakeholders to the control process is the Earned Value Management System (EVMS). The SPOs for major weapon systems monitor sustainment contract performance using EVMS and Integrated Baseline Reviews (IBRs). The IBR is a joint assessment by both the contractor and DoD of the contractor's Performance Measurement Baseline that covers the entire scope of work to ensure the work is realistically and accurately scheduled and the right amount and mix of resources have been assigned to accomplish all contractual requirements.¹⁶ The PM and SPO are responsible for conducting the IBR. Throughout the research efforts, no information was discovered to expound upon control mechanisms the ALCs use, or how they fit into the PPBE or requirements process.

The IBR is the formal management review component and an integral part of the EVMS. The EVMS is a standardized cost, schedule and performance measurement control system used in DoD acquisition programs¹⁷. The IBR uses outputs from the EVMS in monitoring the funds expended on a contract (cost variances) and the progress made on the contract (schedule variances). During the IBRs, the technical capability of the product or level of support provided (performance) is also evaluated. The objective of the IBR is to focus the DoD program manager on any potential threats to the sustainment contract as soon as possible in any of these three areas (cost, schedule and performance), and to take any necessary actions before the problems reach a critical point where the contract scope of work can no longer be achieved. The DoD program manager is essentially using the IBR as a means of minimizing contractual performance risk by focusing on information that is directly relevant to the completion of the desired outcome, that being a successful completion of the sustainment contract.

¹⁶ AF Acquisition Handbook, *IBR Team Handbook*, Jan. 1999.

¹⁷ Earned Value Management Systems (EVMS) are a contractual requirement for DOD major contracts with dollar thresholds >\$70M for RDT&E contracts and >\$300M for production contracts.

In terms of the Cybernetic Feedback Model¹⁸, the IBR is used in controlling contractual cost, schedule and performance. The IBR is a way of focusing and motivating the contractor to achieve the goal as detailed in the contractual plan. The goal is to determine if the contractor is making progress toward the contractually stated objectives. In completing the goal, the DoD does not want surprises that will put sustainment at risk. The process is being monitored using deductive means (using EVMS), and deals with a very complex and diverse undertaking. Additionally, the process is examining the past and present progress as it relates to fixed budgetary targets (the standards). The process is also focusing on negative feedback, primarily using management by exception.

Now turning to the specifics of the Cybernetic Feedback Model, the SPO and contractor negotiate the expected contractual outcome during initial contract negotiations, and the inputs, processes and outputs are then aligned to provide for and monitor progress towards the negotiated outcome. The inputs into the model include the equipment, people and tasks needed to perform the statement of work in the contract. Once the inputs have entered the model, the next step is to process the respective cost data into a usable format. At this point the costs are allocated to cost accounts [a.k.a. work breakdown structure (WBS)] as the work is performed. In the EVMS system, the output (feedback) is a series of cost data reports¹⁹ that provide the user (the program managers and financial managers) with cost and schedule variances on the contractor's status on contract performance. The budgetary boundaries used in the variance analysis are determined ex ante during the initial contract negotiations, and allocated down to the WBS level with a cost account manager (CAM) responsible for one or more WBS. The budget is the roadmap to follow during the execution phase of the contract, and any deviations from the plan will be scrutinized during the IBR. At this stage, the DoD program manager will examine any negative EVMS feedback on a management by exception basis.

¹⁸ Department of Defense Instruction, 5000.2. *Operation of the Defense Acquisition System*. 2003.

¹⁹ Commonly used Earned Value Management System (EVMS) cost reports for an Integrated Baseline Review are the Cost Performance Report (CPR) and Cost/Schedule Status Report (C/SSR).

The EVMS feedback data, as previously mentioned is the cost and schedule variances. This data is generated ex post to work completion and provides a feedback loop in the IBR review process. The DoD program manager can use the variances to determine whether the contractor's performance is on schedule and within cost, and can then direct limited management time on problem areas to make ex post adjustments to inputs and/or processes. The variance outputs are a signal on what the DoD program manager feels is important to monitor and control. Since overspending a contract is an Anti-Deficiency Act (ADA) violation and punishable by law, the DoD program manager is negatively incentivized to keep costs within budget, and establishes controls to limit the risk of the contractor having a cost overrun and possible ADA violation.

These performance measures (cost and schedule variance) are primarily focused on the output end of the model due to the fact that the cause and effect relationship between costs and support are either too complex given the nature of sustainment support, not well understood by the DoD program managers or simply too costly to monitor in the input and process stages. Direct monitoring of every WBS on the contract is beyond the span of control of most DoD program managers.

To further complicate matters, there are internal and external tensions in this business relationship. In this particular case, there are tensions between the different participants in the IBR system in regards to how they manage costs and profits. This leads to an incomplete management control system and to dysfunctional behavior. Examining the contractual relationship mainly from a financial perspective, the participants, the DoD and contractors, view the contractual funding arrangement differently. The DoD is primarily concerned with keeping the contract within costs while at the same time ensuring the contractor is able to stay on schedule and deliver the agreed to performance or product. The contractor shares the same aforementioned concerns as DoD, but with one major difference, the contractor has a profit motive that may put them at odds with DoD.

As one can visualize, there are numerous reporting channels and requirements in the sustainment process. These mechanisms and requirements span the entire chain of stakeholders from operational end users to top level decision-makers, and communication

at each stage is critical to the success of any program. As previously outlined, there is not one clear line of authority and therefore, entities rely heavily on the inputs, processes, outputs and collaboration of others. DoDI 5000.2 stipulates the PM is responsible for collaborating with the end users to document performance and support requirements;²⁰ “Even though the PM is not the ultimate decision-maker for source selection, recent changes in the logistic community are requiring that MAJCOMs take a more active role in defining and prioritizing requirements.”²¹ Therefore, there must be mechanisms in place to facilitate effective communication between the stakeholders. According to the authors of *Three Programs and Ten Criteria*, the Air Force has established a structured approach for communicating and reporting program status at every level.²² The authors advocate setting aside specific time, either on a monthly or more frequent schedule, to ensure that vital communication is not placed on the back burner.

The purpose of this section was to provide a broad overview of the requirement generation and control process as it pertains to the sustainment phase of a weapon system. It is imperative for the business community to have a thorough understanding of how this critical process ties into the business community functional processes for the reasons that will be discussed in later sections.

C. THE FINANCIAL MANAGEMENT PERSPECTIVE

Now turning to the specifics of funding the sustainment requirements, once the sustainment requirements have been identified and then prioritized as a funded requirement, the next step is to perform the funding function which includes such activities as building the cost estimate for the requirement, then budgeting for it and finally monitoring the execution of the budget. Many of the funding processes are in place to show key stakeholders (Congress, DoD and Air Staff) where funds will be spent (i.e., the budget) and how efficiently the funds are being spent (i.e., the execution). The remainder of this section will address the funding process from the cost to the budget

²⁰ Department of Defense Instruction 5000.2, Paragraph 3.9.2.3.

²¹ HQ USAF/ILI. *White Paper on “Future Financials - More Combat Capability for the Dollar Spent.”* September 2004.

²² Johnson, Robert V. and Birkler, John. *Three Programs and Ten Criteria*. RAND, 1996, Page 24.

execution phase, and the implications on properly funding the sustainment requirements from a financial management functional perspective.

1. Building the Cost Estimate

When balancing between cost, schedule and performance, detailed cost estimates must support the trade-off decisions. As with any requirement, whether it is a research or procurement effort, there must be an estimate of the costs for that particular effort, using the different cost estimating methodologies. The methodologies can be a combination of parametric, expert opinion, extrapolation and analogy cost modeling techniques. The cost estimate for the sustainment requirement is documented in operation and support cost elements that were recently revised and standardized by the Office of the Secretary of Defense Cost Analysis Improvement Group (OSD CAIG). The OSD CAIG groups the total sustainment requirement into the following six major cost element categories²³:

1.0 UNIT PERSONNEL

2.0 UNIT OPERATIONS

3.0 MAINTENANCE

4.0 SUSTAINING SUPPORT

5.0 CONTINUING SYSTEM IMPROVEMENTS

6.0 INDIRECT SUPPORT

As one Institute for Defense Analysis expert pointed out in a briefing on operation and support costs, one of the challenges in performing an operation and support cost estimate is in defining the scope and boundaries of the estimate by knowing the costs to include (relevant costs) and the ones to exclude²⁴. The expert argued for including all costs directly traceable to the weapon system that would only exist if the system exists. This links back to requirement generation. The cost estimator must understand how the operation and support costs relate to system characteristics, support concepts and operating concepts. The system characteristics include reliability, maintainability and

²³ Office of the Secretary of Defense. Cost Analysis Improvement Group. Final Working Draft of *Operating and Support Cost Estimating Guide*. 2005.

²⁴ Wilson, Jim. Cost Analysis Research Division, Institute for Defense Analysis briefing on "Operation and Support Cost Analysis." Jun. 2004.

design factors. The support concepts include the way the weapon system approaches maintenance, supply and training concepts. The operating concept is concerned with planning for wartime versus peacetime operations.

Using the Cost Analysis Requirement Description (CARD) and/or similar type data as the source document, cost estimators and support financial managers will allocate sustainment requirement costs into the six broad CAIG cost elements, further breaking them down into sub-cost elements to encompass the total operation and support requirement. For the purpose of this research effort, the cost estimate discussion will not go into great detail into any of the cost element categories, because each weapon system will, for the most part, have distinct requirements in each category, but instead will focus in general terms on how the cost estimators and support financial managers go about building the operation and support cost estimate and then budgeting for it. In building the cost estimate, every effort should be made to ensure the costs are applied to the appropriate cost element. In some cases the costs will be spread over multiple cost elements or not be required at all for that particular cost element. If a determination must be made on the best cost element to use for allocating costs, the two principles to use in making that determination are first to try to keep the cost in the appropriate major category listed above, and second to include costs in the predominant cost element if the costs cannot be segregated into multiple cost elements²⁵. Of course any determinations such as this must be properly documented in the cost estimate.

To aid the cost estimator in building an estimate, the Office of Secretary of Defense (OSD) requires the Services to develop a database for reporting operation and support costs, called Visibility and Management of Operation and Support Cost (VAMSOC). The Air Force uses a database called Air Force Total Ownership Cost (AFTOC) to fill this requirement. One caveat on the data from this system is that it may not be complete or easily transferable to another weapon system, and will need to be analyzed and adjusted to fit the cost estimate under consideration.

The major cost categories are for cost requirements at the unit, organizational and depot level, and the effort can fall to either an organic--AF or other governmental

²⁵ Office of Secretary of Defense, Cost Analysis Improvement Group. Final Working Draft of *Operating and Support Cost Estimating Guide*. Sep. 2005.

agency--or to a contractor. One area to pay particular attention to when building the cost estimate is the increasing use of contractor support in the sustainment phase. Special emphasis must be placed in the identifying the cost elements using contractor logistic support. The costs associated with this contractor provided support must be separately identified for decision making, reporting, contractual and performance measurement purposes. The costs associated with this contractor provided support must be separately identified for decision making, reporting, contractual and performance measurement purposes. The contractor-related cost elements will be comprised of various Work Breakdown Structure (WBS) cost accounts that have different cost behavior. These cost accounts are separated into direct, indirect, recurring and non-recurring cost categories. The direct cost WBS accounts should be traceable to the sustainment requirement. The indirect cost WBS accounts, such as general administration and overhead, are not traceable to the sustainment requirement but do support it. The continuous workload WBS cost accounts are classified as recurring costs (variable costs), typically funded with an Operation and Maintenance Appropriation, and the one-time capital investments, for such items as facilities and equipment, are classified as non-recurring costs (fixed costs), typically funded with a Procurement Appropriation. It is important for decision making purposes to accurately categorize the costs according to their behavior type to understand the impact on sustainment from either increasing or decreasing costs in certain WBS cost accounts.

On the organic side--the government run operations--the costs elements are broken down into a series of Budget Activities (BAs) and further subdivided into Elements of Expense Investment Codes (EEICs) or Budget Programs (BPs)²⁶. In the case of converting appropriated funding into the Working Capital Fund (WCF) accounts, the funds are subdivided into the respective activities group, primarily the Supply Maintenance Activity Group (SMAG) or Depot Maintenance Activity Group (DMAG)²⁷.

Now when it comes to large-scale depot maintenance and repair, and supply workload determinations, all of which are major components of TOC, the Business Case Analysis (BCA) becomes the tool of choice for making that kind of enterprise-wide

²⁶ AFMAN 65-604 *Appropriation Symbols and Budget Codes* provides a complete list of BAs, EEICs and BPs for all appropriations.

²⁷ The Air Force Working Capital Fund also includes the Information Services Activity Group (ISAG) and Transportation Activity Group (TAG).

decision. In accordance with the public laws mentioned in the Identifying Requirement section, some of the workload will inevitably be sourced to organic providers without the need of a BCA. For the workload open to the source assignment process, a BCA will be performed to assist the decision makers in making a “best value” source determination. Citing the growing importance of BCAs, SAF/FM recently issued a document, titled *Interim Guidance for Business Case Analysis* to standardize BCA methodology across the financial management community²⁸. The purpose of standardizing the process is to provide a tool that will support all USAF strategic decisions across all functional communities and at all levels of the organization. The BCA brings us one step closer to being more efficient and effective in the way we spend our funding.

The financial management community routinely uses Analysis of Alternatives (AoAs) for ACAT I (and ACAT II and III as directed) milestone decisions and Economic Analyses (EA) for small-scale investment projects. The BCA bridges the gap between these two types of decision support tools. Though a BCA may mirror the AoA and EA in some aspects, the main difference is the approach taken in the execution phase as documented in the Change Management Plan section of the BCA. The Change Management Plan identifies the key stakeholders, documents the action plan and delineates key performance measures and outcomes. The BCA essentially serves as stand-alone decision making tool linking the requirement, the costs, the benefits, the budget and the performance parameters, and should be later used as a control mechanism of an ongoing management control system.

2. Formulating and Executing the Budget

The budget process is another aspect of the funding environment that is important to understand when funding sustainment requirements. It is directly linked to the cost estimate and more importantly, indirectly linked to the readiness and warfighting capability objectives of a program. Under the current SECDEF regime, the budget execution phase in particular has been emphasized as the control mechanism for ensuring limited discretionary funds are being spent on the capabilities necessary to successfully

²⁸ SAF/FM memorandum on “Interim Guidance for Business Case Analysis.” Mar. 2005.

accomplish the mission. Successfully executing the sustainment budget requires the translation of the cost estimate to the next stage, the budget formulation and execution phase. This transition from a cost estimate to an executable budget requires a thorough understanding of the different “colors of money” and the intricacies of the budgetary process as it pertains to the sustainment process.

Funding for the sustainment requirement strategy requires the use of all appropriation sources, though the majority of the funding comes from Operation and Maintenance, and Military Personnel Appropriations, and the Working Capital Fund (WCF). Overriding the use of all Appropriations is the “Purpose” (what you can spend), “Amount” (how much you can spend) and “Time” (when you can spend) rules. In accordance with Title 31, USC 1301(a), “appropriations shall be applied only to the objects which the appropriations were made except as otherwise provided by law.” This statute pertains to the Purpose for which the appropriation may be spent. The allocated funding may only be spent on those sustainment requirements requested for in the President’s Budget, to include the supporting budget documents (FINPLANS, CLS Brochures, etc.). The Amount relates to the funds provided by Congress and subsequently allocated/allotted to the end user. When it comes to the Amount, the user can not spend more funds than they have been allocated. The Time rule has to do with the number of years the appropriated funding is available in which to obligate and expend the allocated funds. The figure below lists the obligation and expenditure years for all the appropriations (Figure 8). After the cost estimate has been calculated in a specific Base-year (kept constant using the OSD Raw Inflation Index), the estimate must then be time-phased over the fiscal years, adjusting for inflation (converted to Then-year dollars using the OSD Weighted Inflation Index).

APPROPRIATION	OBLIGATION YEARS	EXPENDITURE YEARS
Research, Development, Test and Evaluation (RDT&E)	2	5
Procurement	3	5
Operation & Maintenance (O&M)	1	5
Military Personnel (MILPERS)	1	5
Military Construction (MILCON) and Military Family Housing (MFH) Construction	5	5
Working Capital Fund (WCF) (Customers follow O&M Appropriation restrictions)	No-year	No-year

Figure 8. Appropriation Obligation and Expenditure Years.

When it comes to funding product improvements (a modernization program) the funding stream is not as straightforward as for the other requirements. The following figure depicts the correct appropriation source depending on production, performance and test requirements for the particular effort (Figure 9)²⁹:

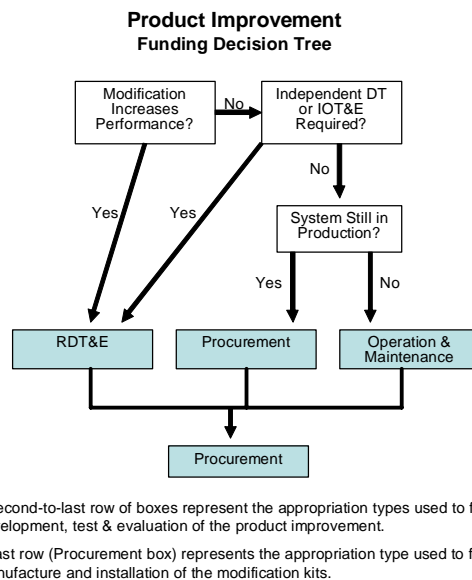


Figure 9. Product Improvement Funding Decision Tree.

In the early stages of the Operation and Support phase, as programs plan for their long-term sustainment approach, most programs typically use an Interim Contractor

²⁹ Source: BCF103 Fundamentals of Business Financial Management.

Support (ICS) type contractual arrangement, funded through an investment appropriation³⁰. In an ICS type arrangement, a contractor provides the initial support for the weapon system. Once the program converts to a long-term sustainment arrangement, the sustainment requirement converts to O&M Appropriation funding, with the exception of initial spares and common support equipment which will continue to fall under the Procurement Appropriation. It is at this stage when the lead MAJCOM takes on the role of funding the sustainment requirement. During this stage of the funding process, the Budget and Execution phases of the PPBE process, Bases, SPOs and ALCs submit their sustainment requirement budget estimates to the responsible MAJCOM Financial Management Branch, who then rolls-up the estimates for submission to SAF/FMBO. The consolidated budget estimate is then validated through the AF Corporate Structure and once approved by OSD become part of the President's Budget (PB). Once Congress enacts the PB into an Appropriation Bill and the President signs it, the funding is then warranted from the Treasury, apportioned by the Office of Management of Budget, allocated to the Services, allotted to the MAJCOM Financial Management Branches and finally sub-allotted down to the respective Bases, Air Logistic Centers (ALC) and/or System Program Offices (SPO). Funds may also transfer to an ALC by way of a Project Order. For funds sent to the contractor, a contract is the source document for obligating the funds.

One area of special interest in the requirement and funding process is the allocation of funding for partnership efforts between the organic depots³¹ and contractors. According to DoDD 5000.1, "sustainment strategies shall include the best use of public and private sector capabilities through government/industry partnering initiatives, in accordance with statutory requirements³²." When it comes to funding partnering arrangements, organic depots generally prefer "Workshare" type funding arrangements, whereas contractors prefer "Direct Sales" type arrangements. Under a Workshare funding arrangement, funds for organic support are sub-allotted directly to the organic

³⁰ Office of Secretary of Defense, Cost Analysis Improvement Group. Final Working Draft of *Operating and Support Cost Estimating Guide*. Sep. 2005.

³¹ The term "organic depot" is referring to government workload providers, for example an Air Logistic Centers (ALCs).

³² Department of Defense Directive 5000.1. *The Defense Acquisition System*. May 2003.

provider who then negotiates the delivery schedule with the prime contractor. Under a Direct Sales arrangement, the prime contractor is funded in the contract for organic-provided workload. In this type of arrangement, the government is in essence serving as a subcontractor to the contractor. The organic depots argue that a Workshare type arrangement saves the government on higher pass-through indirect costs charged by contractors under Direct Sales arrangements. The contractors, on the other hand, argue for funding control via contractual arrangements with organic providers in order to maintain a Total System Performance Responsibility (TSPR) role to limit non-performance risk from an organic provider. An argument could be made that from the PM's standpoint the added pass-through costs associated with Direct Sales may be worth the cost of transferring oversight from the PM to the contractor. One could further argue the contractor not only has the experience and processes to monitor performance, but also has a vested interest, through incentivized contracts, to have the support provider, an organic depot in this case, perform according to contractual specifications. On the flip side, if the contractor's are primarily concerned with performance risk, the organic depots success with Lean Transformation efforts should be factored into the decision making process in favor of a Workshare type of arrangement. Whatever the underlying reasons may be for the particular type of arrangement, the approving authority for the arrangement ultimately depends on dollar thresholds, type of arrangement and parties involved. In most instances, either the AFMC/CC or the ALC/CC will be the approval authority³³.

One issue mentioned in partnering arrangements that should not be overlooked by the financial manager is the manner in which to incentivize contractual performance. This is applicable to both the organic and contractor support providers, though the financial incentive measures are primarily applicable to private sector support providers, non-financial measures, on the other hand, are applicable to both. The contractual aspect will be discussed more thoroughly in the Contracting section. Suffice it to say that during the design of the contract vehicle the financial manager must be involved early in the

³³ Draft of *AFMC Depot Maintenance Partnering Guide*, Apr. 2003.

acquisition planning process to provide financial advice to ensure the funds are made available to cover the requirement and incentive or award fee structure.

In summary, the funding is another important aspect of the sustainment phase to understand. It is important to understand how the requirement fits into the cost estimate and then how the cost estimate is used to build a defensible and executable budget. In building the cost estimate, the cost estimator must define the scope and boundaries of the cost estimate, and then when it comes to putting together the budget, the financial managers must be able to defend the contents of that budget. In defending the budget, the financial manager must have a thorough understanding of the requirement and subsequent cost estimate that makes up the budget submission, and understand how changes to the budget will indirectly impact on readiness levels. Lastly, the financial manager must be able to provide funding expertise to support the budget execution phase of the sustainment strategy, whether it is in the form of an organic, contractor or partnering type approach.

D. THE CONTRACTING PERSPECTIVE

The idea of contracting for the long term sustainment of major weapon systems brings with it new challenges and issues that must be addressed before the full potential of PBL type arrangements can be realized. This section will discuss contracting and what should be done to facilitate the arrangement for the requirement/capability while also reducing the associated risks involved. The key contracting elements identified in this section will essentially serve as a model for conducting a case study on the two weapon systems identified for our analysis (F-16, and C-17), determining how each program office approaches sustainment from a contracting perspective. Key elements will be taken from the following areas: Managing the Relationship, Managing the Contract, and Managing the Risks.

1. Managing the Relationship

The recent push by our leadership to shift toward a PBL strategy has given rise to new unintended consequences that must be addressed before we can fully realize the potential benefits. One such consequence is the move that must be made toward

asserting more emphasis on managing the relationship with the contractor. The PBL approach characterizes itself on the ability to gain public and private sector capabilities through strategic partnerships with industry. This collaborative approach is distinctly different than the adversarial relationship that has historically existed between government and industry. In order to facilitate the success of PBL support arrangements, the old standing culture of secrecy and distrust by the government and industry must begin to erode. Open communication, early involvement by all key stakeholders, and trust must begin to surface in order for PBL arrangements to be as effective as possible. Although it may be initially difficult to quantify and measure the value of these relationships, there are tools that can be implemented and used to facilitate a good working relationship with the contractor. One such tool is the formation of a PBL team early in the acquisition process. When forming the PBL team, the government (Program Manager) should establish the team with the purpose of developing and managing the implementation of a PBL weapon system support strategy. The team should consist of government and private-sector functional experts who are able to work across organizational boundaries. As mentioned earlier, this may require a cultural change for the government and industry as both stakeholders have traditionally had an adversarial pull and take relationship versus a collaborative relationship. By implementing PBL oriented Integrated Product Team (IPT), both parties will ensure consideration throughout the design, and development of the support strategy, as well as obtaining an optimum PBL strategy that will leverage both government and industry best practices in the most cost effective manner³⁴.

2. Managing the Contract

The preferred PBL contracting approach is the use of long-term contracts with incentives that are tied to performance. These incentives should be tied to metrics that are tailored to the specific performance requirements and should be designed to decrease government risk while incentivizing contractor performance and cost control measures. Although there has been an increase in the number of sole source support services

³⁴ Defense Acquisition Guidebook. Defense Acquisition University (chap 5.3). Retrieved from <http://akss.dau.mil/dag/Guidebook> Sep. 2005.

contracts, in general, PBL contracts should always be sourced competitively to foster a process that encourages price reductions. That being said, one of the most powerful tools the government has that serve to reduce and manage PBL risk is the structuring of the contract itself. For PBL type contracts, a set of metrics needs to be developed with involvement from the end user of the support. These metrics must relate directly to the end user's requirement and should be easy to gather, accurately measurable, and validated against the contractor's performance. The overarching goal of a PBL arrangement is to compress the supply chain, eliminate non-value added steps, reduce Total Ownerships Cost, and improve readiness for weapons systems and commodities. For those reasons, goals should be facilitated through the contractually established metrics that focus on such areas as Reliability/Maintainability/Availability (i.e. on time delivery, production lead time etc), Readiness (i.e. mission capable, non mission capable), Requisition (i.e. backorder age, fill rate) and, Inventory Turnover Rate³⁵. Noncompliance with contractually established metrics has a direct impact on warfighter readiness. Therefore, it is essential that the government and contractor have a complete understanding of those metrics and the repercussion of noncompliance. Consequently, incentives, penalties and adjustments can be a powerful tool in supporting the performance objectives of a PBL contract by motivating a contractor to achieve defined objectives. Incentives can be monetary with the establishment of an award fee/incentive fee pool; or non-monetary, exhibited by contract extension, exercise of options, or longer contract term. Contract incentives can take a positive or negative focus, and are generally used to motivate positive behavior³⁶. When establishing monetary contract incentives it is important to note that incentive fees are designed to incentivize the contractor to control costs while award fees are designed to incentivize the contractor to improve performance. An analysis should be done to examine which aspects of the contract the end user values most. If cost control is more important than performance, more emphasis should be placed on structuring an incentive fee. If, however, performance is valued

³⁵ Defense Contract Management Agency. (Oct. 2002). *Performance Based Logistics Support Guidebook*. p4. Department of Defense.

³⁶ Defense Contract Management Agency. (Oct. 2002). *Performance Based Logistics Support Guidebook*. p24. Department of Defense.

more than cost control then an effective award fee structure should be emphasized more heavily.

3. Managing the Risks

For any weapon system, throughout the systems life cycle, risk must be considered as a critical part of the equation. The responsible agency, whether it is the government or a contractor, must address ways in which to mitigate risk by avoiding, eliminating or accepting the risk. Before discussing the tools used to identify and mitigate some of the risk inherent in PBL arrangements, it's important to note that under a PBL contractual agreement, significant risk is transferred from the government to the contractor. Figure 10 depicts the evolution of risk transfer, from full Organic (government operated logistics) to full CLS (Contractor Logistics Support).



Figure 10. Risk Transfer under Performance Based Logistics.

It is for this reason that a proactive effort needs to be established by the PBL IPT to effectively identify and employ tools to mitigate risk associated with PBL arrangements early in the support acquisition process.

A risk based Pre-award Survey is one general means of identifying and providing valuable information about prospective contractors and the associated risk they may bring to the government. A pre-award survey is an evaluation of a prospective contractor's capability to perform under the terms of a proposed contract, and assists the government in the selection of capable suppliers by identifying acquisition risk and developing

contracts that can be successfully completed³⁷. This evaluation of contractors is used by the Contracting Officer in determining the prospective contractor's responsibility³⁸. The results obtained from the survey should assist in the award/no award recommendation, as well as include recommendations to the customer as to how to mitigate the risks identified³⁹.

An additional area of concern involving early identification of risk is the recent legislative initiatives allowing contractors more flexibility with regard to the pricing of their products and services. This flexibility has crippled the government's ability to determine price reasonableness by obtaining certified cost or pricing data in some PBL arrangements. TINA (Truth in Negotiations Act) regulation requires that the contractor submit cost or pricing data for negotiated procurements above a certain threshold. The information submitted by the contractor must also be certified (by the contractor) as being current, accurate, and complete at the time of the submission. To that degree, TINA serves as a tremendous leveraging tool for the government allowing them to effectively determine price reasonableness by verifying and validating the contractor's cost accounting system. However, exceptions to the TINA requirement, one of which is commercial item designations, have crippled the government's effort to obtain fair and reasonable pricing. Any product or service that receives a commercial item designation is exempt from TINA requirements. Furthermore, with the passing of FARA (Federal Acquisition and Reform Act) and FASA (Federal Acquisition and Streamline Act) legislation, the definition of commerciality has been expanded, making it easier for contractors to classify products and services with a commercial item designator. The dilemma comes to surface when, as a result of commercial item designation, contractors are relieved of submitting certified cost or pricing data. This in itself may not be of great importance except for the fact that more and more support service acquisitions with bigger price tags are being categorized as commercial thereby removing a critical tool the

³⁷ Defense Contract Management Agency. (Oct. 2002). *Performance Based Logistics Support Guidebook*. p17. Department of Defense.

³⁸ http://www.gpo.gov/procurement/ppr/ppr_chap11.html Oct. 2005.

³⁹ Defense Contract Management Agency. (Oct. 2002). *Performance Based Logistics Support Guidebook*. Page 17. Department of Defense.

government uses to negotiate fair and reasonable prices. To put this into perspective the Air Force acquisition of the JPATS (an ACAT 1C program) aircraft was determined to be a commercial acquisition and was pursued under a commercial sole source contract⁴⁰. In addition, the CLS (Contractor Logistical Support) portion of JPATS was also considered commercial and its solicitation, valued at over \$134M, was not subject to certified cost or pricing data review (S.L. Drago, Contracting Officer, personal communication). That in itself illustrates the amount of potential risk that the government typically inherits when contracting for support services, as well as underscores the need to find effective tools for negotiating large ticket ACAT level sustainment contracts without the use of cost and pricing data. That is why enlisting the assistance of support agencies (e.g. DCAA and DCMA) to help determine price reasonableness is essential. If cost and pricing data is not obtainable by the government, these support agencies have other tools at their disposal designed to assist the contracting officer and program manager in determining price reasonableness.

With the application of the tools, processes, and procedures discussed in this section (i.e., managing the relationship, managing the contract, and managing the risks), the contracting functional community will be able to formulate better decisions that will increase the likelihood of a successful weapon system support acquisition. The contract actions identified in this section will serve as a framework for questions that will be posed to program managers and contracting officers for the identified weapon systems to be evaluated (F-16, and C-17). The responses received will serve as a basis for analysis, recommendations, and suggested good practices that should be used for the acquisition support of future weapon systems.

E. SUSTAINMENT BUSINESS MODEL

For the business community, the approach to sustainment of a weapon system centers around one critical question: what support is required to successfully accomplish the mission. With a number of competing perspectives, this question is not as easy to

⁴⁰ Joint Primary Aircraft Training System. (2001). *Single Acquisition Management Plan* for the Joint Primary Aircraft Training System (Milestone III). Page 11.

answer as one would expect. First the overarching objective must be defined. In this case, the overarching objective is what the customer, the warfighter, considers as the goal of the sustainment effort. In the Sustainment Business Model (Figure 11), the goal from the perspective of the warfighter is defined as "readiness" in terms of having a weapon system that supports the operational forces according to key performance parameters and thresholds that will enable the warfighter to complete the mission, in other words, provides a warfighting capability. For an aircraft weapon system, readiness and warfighting capability are measured at the operational level in terms of metrics such as Aircraft Availability, Non-mission Capable for Supply or Maintenance and Cannibalization rates to name a few. The business community is responsible for costing out, budgeting for and procuring the requirements, via contractor and/or organic provided support, to achieve these operationally-focused metrics.

Sustainment Business Model

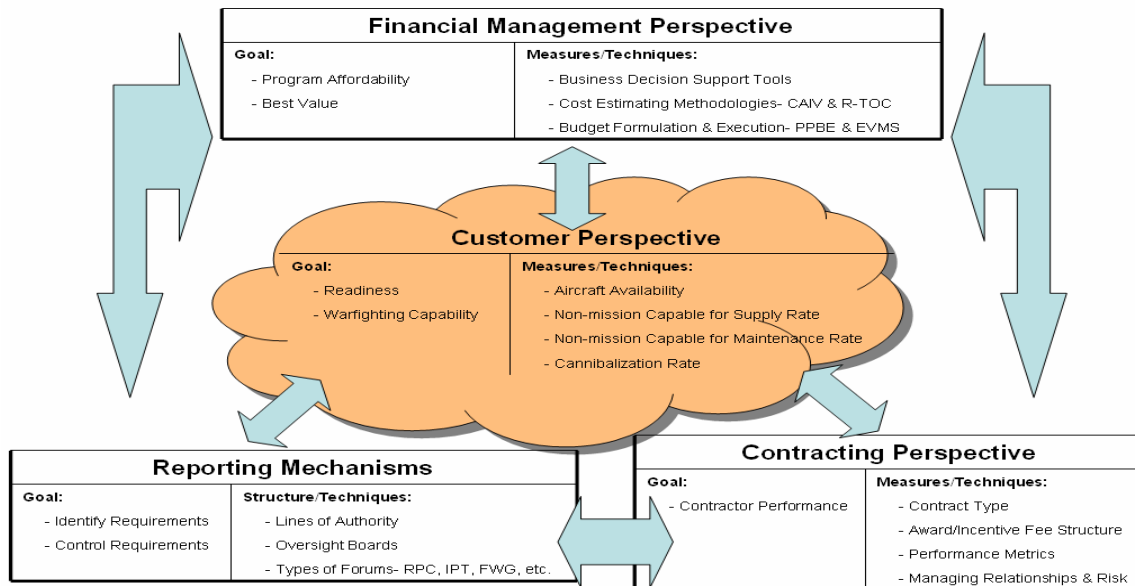


Figure 11. Sustainment Business Model adapted from the Balanced Scorecard Model in *Performance Measurement & Control Systems for Implementing Strategy* by Robert Simons.

1. Description of Sustainment Business Model

From the literature review on the Operation and Support phase of a weapon system's life cycle, the project team narrowed down the focus to three critical areas that have been recognized as necessary for a successful sustainment program: Reporting Mechanisms, a Financial Management Perspective and a Contracting Perspective. These three critical areas have been structured into a model adapted from the Balanced Scorecard methodology⁴¹. The Balanced Scorecard model serves as a way to exploit the intangible, as well as the tangible resources in an organization, and in the process identify the key success factors that an organization must focus on to achieve their objective. In DoD's case, that focus should be on readiness and successful mission accomplishment. In the center of the model is the Customer's Perspective. The cloud encircling the Customer's Perspective is indicative of the fact that the operation and support provided by the business community functionals is often difficult to directly link to the end goals of readiness and warfighting. The arrows pointing from the three critical areas towards the center, to the Customer Perspective, indicate all effort in these external areas should be focused on the customer's readiness and warfighting capability goals. The external arrows pointing towards each of the three external critical success factor areas indicate that all three areas are intrinsically linked and interdependent on one another. This descriptive analysis will now turn to the details of the three critical success areas, each with their own success-oriented goals, and measures, techniques and structure, all which should be directed towards achieving the customer's end goal(s).

a. Reporting Mechanisms

As for Reporting Mechanisms, the primary goal is to identify and control sustainment requirements. The focus in this area is on having the structure and processes in place to identify and control requirements. One of the most important considerations is to have clear lines of authority between all the key stakeholders which will delineate each participant's area of responsibility in the decision-making process, especially for

⁴¹ Simons, Robert. *Performance Measurement & Control Systems for Implementing Strategy*. 2000.

oversight boards which heavily influence the process. The process used by the all participants in the sustainment approach is the Planning Programming Budgeting and Execution (PPBE). It is a mechanism for transitioning the requirements identified in the programmatic stage into an executable and defensible budget. Influencing the process at the lower operational levels is different forums. This includes group activities such as Integrated Process Teams (IPTs), Requirement Planning Councils (RPCs), and others.

b. Financial Management Perspective

The funding approach has at its heart the goal of program affordability and determining best value. This is in-line with recent financial efforts to use costs as an independent variable in trade-off decisions, applying cost realism in the cost estimation process, and reducing total ownership or life cycle costs. The measures and techniques in this area focus on the affordability and best value goals which should be in alignment with the customer's goal. The measures and techniques include the application of decision support tools, cost estimating methodologies and PPBE. To support the decision-makers in making enterprise-wide determinations, decision support tools, such as a business case analysis or similar methodologies, are used to capture and report costs and benefits. The output from the decision support tools are used later in the budget formulation and execution phases of the PPBE process. The Earned Value Management System or similar type processes are used in the execution phase of the PPBE process, serving as a means to monitor and control the expenditure process.

c. Contracting Perspective

The Contracting Perspective is the last critical area that will be analyzed using this model. The success factor goals in this area are incentivizing contractor performance and fostering a competitive environment. These goals are aimed at reducing cost, and increasing the customer's goals of a high level of readiness and enabling warfighting capabilities. To do this, the contracting functional uses a number of measures and techniques. One such technique is to use the appropriate contract type, ranging from cost-plus to fixed-price type contract arrangements. In addition to contract type, the contracting functional used an award/incentive fee structure to either encourage

performance, reduce cost or both. When it comes to the incentivizing contractor performance, performance metrics are a critical aspect of the management control structure. The performance metrics must be documented and agreed to in the contract and then monitored during the contract execution phase.

F. CONCLUSION

The purpose of the literature review is to provide an informed foundation on factors critical to the business community in successfully supporting a long-term sustainment program for a major weapon system. In this literature review, a description of the current fiscal environment was given as a backdrop for the problems facing programs in the sustainment phase. During the research, the project team identified three main areas in which to categorize the critical business community success factors: (1) Reporting Mechanisms; (2) Financial Management Perspective; and (3) Contracting Perspective. Based on these three main areas, the project team constructed a Sustainment Business Model for analyzing a weapon system.

III. DESCRIPTION OF WEAPON SYSTEMS AND DESCRIPTIVE ANALYSIS OF BUSINESS APPROACH

In this section, the research team will provide a description of the weapon systems and conduct a descriptive analysis of the weapon systems using the Sustainment Business Model presented in Chapter 2. The two weapon systems are the F-16 Falcon, a mature weapon system, and the C-17 Globemaster, a more recently-fielded weapon system. This section will examine the business practices applied by the System Program Offices (SPOs) in their respective approach to long-term sustainment of the weapon systems. The analysis will be based on information provided by the SPOs, using the Single Acquisition Management Plans (SAMPs), Operational Requirement Documents (ORDs) and other internal SPO documentation.

A. DESCRIPTION OF WEAPON SYSTEMS

1. F-16 Falcon Description

Originally developed by General Dynamics, now Lockheed Martin, the F-16 Fighting Falcon is a multi-role, multi-mission, “combat-proven” fighter aircraft that provides the United States and 23 other countries a comparatively low cost means for air dominance and close air support. From a prototype in 1975, the program has grown to over 4000 aircraft located around the world. The fighter can be configured with air-to-air as well as air-to-ground munitions. It has the capability and range to strike precisely, return to base and within minutes, be reloaded and return to battle over and over again. These characteristics allow the USAF, U.S. allies, and designated foreign military air forces through the Foreign Military Sales (FMS) Program to sustain a competitive advantage of air superiority over enemy combatant aircraft. Sustainment for the F-16 has been accomplished on a sole source basis to Lockheed Martin via firm fixed priced and cost reimbursement contracts. The F-16 program is considered in its midlife of service as the “nation’s premier combat fighter.”⁴²

⁴² ALC/YP, *Single Acquisition Management Plan (SAMP) for the Falcon 2020 Follow-on, F-16 Global SAMP, Annex 029, Dated 25 October 2001*. Hill AFB Utah. Executive Summary, page 10.

2. C-17 Globemaster Description

Since reaching full-operational capability in 1995, the C-17 Globemaster has been the USAF's leading strategic and theater airlift aircraft having the capability of delivering large payloads, flying long distances, accessing austere locations, and airdropping troops and equipment. The Boeing Company is the prime contractor for the weapon system though the contract was initially awarded to the McDonnell Douglas Corporation which has since merged with Boeing. The USAF has programmed for the procurement of a total of 180 C-17 Globemasters, and the Royal Air Force has leased four aircraft⁴³. The C-17 entered the initial concept phase in the late 1970s as a means to fill an airlift capability shortfall. Full-scale development began in 1986. During this time, the aircraft was plagued with technical problems and subsequent funding shortfalls that led to schedule slippages and cost increases. Under a looming Congressional threat of program cancellation, Boeing, over a two year period, eventually resolved the design, concurrency and production problems, though at the expense of a smaller fleet size, decreasing from 210 to 120 aircraft. Over the past decade, the fleet size has since increased to the current requirement of 180 aircraft. As it stands now, the last lot buy will be in FY07.

For operational support, the C-17 is following a two-level maintenance strategy at the organizational and depot-level in order to minimize the special test facilities, skills, tools and equipment needed at the base-level. The maintenance requirements and concepts originated from Logistic Support Analysis and Repair-Level Analysis trade studies. Following the recommendation of the Depot Support Strategy (DSS) study that found no cost advantage to pursuing either a full Contractor Logistic Support (CLS) or organic maintenance support strategy and which recommended a mixed approach, the C-17 SPO extended the Interim Contractor Support (ICS) contract pending final determinations on the depot approach, but kept the propulsion system as CLS-for-life. To contract for these maintenance support requirements, the program transitioned to a Total System Support Responsibility (TSSR) contractual arrangement⁴⁴ with the prime

⁴³ ASC/YC, *Flexible Sustainment Annex to the C-17 Weapon System Single Acquisition Management Plan*, Dated January 2002. Updated Apr. 2003.

⁴⁴ Ibid 43.

contractor, and implemented a public-private partnering approach with the organic depots. The original TSSR contract was termed "Flexible Sustainment" but has since been renamed the "C-17 Globemaster III Sustainment Partnership" (GSP). The C-17 SPO listed the following qualitative factors for pursuing a partnering approach: Expanding the industrial base, creating a competitive environment to keep the program affordable, enabling dual sourcing, building a surge capability, complying with Title 10 and leveraging off of the partners' strengths. Under the partnering relationship, Core workload was to fall under the Air Logistic Centers, and non-Core workload was to be determined through the Source of Repair Assignment Process (SORAP). HQ AFMC/LG was to lead the SORAP in accordance with AFI 63-107. This was an effort to leverage industry and organic capabilities to reach a best value sustainment strategy that complied with Title 10 requirements. Pratt-Whitney, the propulsion subcontractor, continued to operate under a full CLS arrangement for off-wing repair and overhaul of the F-117 Engines. The performance metrics in this GSP contract included: Flexible Sustainment Aircraft Availability (FSAA), flying hours achievable, Mission Impaired Capability Awaiting Parts, Aircraft Depot Maintenance Scheduling Effectiveness, issue effectiveness and customer satisfaction⁴⁵. Material management was to be determined through the Source of Supply Assignment Process (SOSAP) which is similar to a SORAP.

B. DESCRIPTIVE ANALYSIS OF BUSINESS APPROACH

1. Reporting Mechanisms

As previously depicted, the separation between requirements and funding authority processes requires early and continual collaboration and communication of Financial Managers (FM) and key stakeholders to adequately fund product support. The FMs on individual IPTs provide the critical link at each level to translate requirements into readiness. There are several forums, boards and IPTs that orchestrate this process.

⁴⁵ ASC/YC, *Flexible Sustainment Annex to the C-17 Weapon System Single Acquisition Management Plan, Dated January 2002*. Updated Apr. 2003.

The mainstay in this process is communication. This section will look at each program and how management controls the process.

a. F-16 Falcon Reporting Mechanisms

As outlined in the F-16 Global Single Acquisition Management Plan (SAMP) and related annexes, the Program Management Directive (PMD) for the F-16 program directs all activities. The F-16 program is categorized as an Integrated Weapons System Management Program (IWSM) and falls under the direct authority of the Program Executive Officer for Fighter and Bomber Programs (AFPEO/FB).⁴⁶ The PMD specifies the implementation of the Post Production Support (PPS) for the F-16 Program named “Falcon 2020” which ensures contractor support of the entire F-16 fleet. The PMD also serves as the basis for the System Program Directors’ (SPD) development and continuance of the PPS. Based on recent Acquisition Reform Initiatives, the Falcon 2020 contract allows the F-16 SPO to consolidate numerous requirements through multiple contracts into one all-encompassing contract. This “streamlining” allows the SPO to provide the users with sufficient flexibility to meet readiness levels. As of 1 Mar 2002, the Falcon 2020 contract’s period of performance spans 23 years.⁴⁷

According to the “Program Management” section of the F-16 SAMP, the F-16 Systems Program Office (SPO) is responsible for reporting status and program issues to the PEO. The SPO is currently in two locations and is managed by the SPD and the System Support Manager (SSM). The F-16 SPD falls under the Aeronautical Systems Center (ASC), Wing at Wright-Patterson Air Force Base (WPAFB), Ohio. The SPD has overall responsibility for the management and sustainment services required for the PPS Program. The F-16 SSM is located at Hill Air Force Base, Utah and is responsible for providing management interface between the Falcon 2020 contract working levels and

⁴⁶ ASC/YC, *F-16 Global Single Acquisition Management Plan, Dated 19 September 2002.*

⁴⁷ ASC/YC, *Flexible Sustainment Annex to the C-17 Weapon System Single Acquisition Management Plan, Dated January 2002.* Updated Apr. 2003.

the SPD. The SSM has the authority to allocate available resources according to the needs of the F-16 program within specific dollar thresholds.⁴⁸

Since the beginning of the F-16 Program, the F-16 has been upgraded and/or converted several times. The result of these upgrades has left the Air Force and other users with eight different “Block” versions. In addition to these modifications, the SPO is responsible for sustaining the entire fleet to include aircraft sold through the Foreign Military Sales (FMS) Program. As the USAF maintains a configuration baseline for each Block version, any changes to the baseline are only made after the approval of the F-16 Joint Multinational Configuration Control Board (JMCCT/B). The process involves the respective stakeholders and specifically addresses technical feasibility, risk, schedule budget and manpower. Approval is required before any changes or modifications are contracted for. However, for depot level repair, the determination for contractor versus organic responsibility is accomplished through the AF Source of Repair Assignment Process. Normally, if support is not available within time constraints or is “design unstable,” Interim Contractor Support is used.⁴⁹

As the F-16 is categorized as an IWSM program, is it managed by several Integrated Product Teams (IPTs). Membership of the IPTs is made up of personnel from the product center at ASC/YP at Wright-Patterson AFB, OH, and the depot center at OO-ALC at Hill AFB, UT. The SPO IPTs are at the tip of the spear in resolving all problems or issues. The necessary support for each IPT is derived from personnel in all functional disciplines and the contractor, LM-Aero. These teams, and ultimately the SSM and SPD, are responsible for presenting quarterly reviews to the PEO. In addition, monthly reports are submitted which serve to update information, schedule and other issues on each acquisition.⁵⁰

Periodic meetings of these product teams called Technical Interchange Meetings (TIMS) are used to discuss “detailed definitions of requirements.” However, the responsibility of defining requirements, acquisition and modification of aircraft falls

⁴⁸ ASC/YC, *Flexible Sustainment Annex to the C-17 Weapon System Single Acquisition Management Plan, Dated January 2002*. Updated Apr. 2003.

⁴⁹ ASC/YC, *F-16 Global Single Acquisition Management Plan, Dated 19 September 2002*.

⁵⁰ Ibid 48.

on HQ ACC/XRMA.⁵¹ These requirements are added to the Falcon 2020 contract via issuance of “task and delivery orders” once approved by the Joint Requirements Review Team (JRRT). The JRRT is a standing board established to review sole-source requirements, which helps ensure competition is practically maximized. These requirements comply with the AF corporate strategy, Public Law and DoD Directives.⁵²

Contracting Officers (COs) at both ASC and ALC are authorized to add task and delivery orders to the contract via the process of “decentralized ordering” in support of PPS. A Contract Technical Monitor (CTM) resides in both locations within the SPO. The CTM acts as a POC and provides assistance to the contractor, SPO and personnel from the functional disciplines. The COs and CTMs also hold routine forums with the contractor to review in-process orders to ensure cost, performance and schedule requirements are met.

From the Financial Management perspective, each requirement added to the Falcon 2020 contract is independent and is funded as such. Each office that generates a requirement(s) is responsible for budgeting and executing for that requirement(s). Quarterly Program Management Reviews (PMR) evaluates each task/delivery order where a Cost Plus or Time and Material pricing arrangement is utilized. The PMR is chaired by the SSM and SPD deputies. As far as forums revolving around the budgeting and execution function, the SPO documentation does not go into such detail.

b. C-17 Globemaster Reporting Mechanisms

The Air Force Program Executive Office, Airlift and Trainers (AFPEO/AT) is responsible for the C-17 program. The C-17 SPD is responsible to the PEO for program execution, and responsible to ASC/CC for sustainment issues. The C-17 SPD coordinates program requirements with HQ AMC/XP. The first step in the C-17 Business Management Process is the C-17 Requirements and Planning Council (R&PC), which is co-chaired by the C-17 SPD and AMC/XP. The council provides a roadmap for all requirements and consolidates the short-term requirements and long-term plans for

⁵¹ Performance Work Statement, CONTRACT F44650-95-D0002, Task Order 2413.

⁵² ASC/YC, *F-16 Global Single Acquisition Management Plan, Dated 19 September 2002.*

improvement. Reviews link the direction between program requirements and program acquisition.⁵³

The R&PC provides a forum for program-wide presentation, discussion, and review of C-17 program initiatives, requirements and activities involving planning and road-mapping activities. The council consolidates both near and long-term product improvement plans. The reviews foster unity between the planners (HQ AMC/XP) and the acquisition world (ASC/YC) and provide critical guidance for the C-17 program elements. The Supportability Operations Review Team and Crew Operations Review Team are forums specifically designed to review and map out proposed improvements or changes to the C-17. The recommendations by both the SORT and CORT are then forwarded to the R&PC for consideration and approval.⁵⁴

The SPD has solidified the importance of creating and implementing partnerships between the Prime Contractor and the ALCs. This is accomplished through the Global Sustainment Partnership (GSP) formed by the C-17 SPD. Via the Flexible Sustainment Annex to the original SAMP, the GSP includes members from the C-17 SPO, ALCs, members of headquarters at both AFMC and Air Mobility Command (AMC), and Boeing. Every 60-90 days, SAF/AQ and AF/IL and all stakeholders referred to as “Gatekeepers”, provides direction on sustainment and partnering to the GSP which in-turn reports progress. Based on guidance from gatekeepers, Boeing acts as the Total System Support Responsible (TSSR) contractor and partners with ALCs for Core workload of the C-17 for long-term sustainment.⁵⁵

The C-17 program has implemented an Integrated Management Plan/Integrated Master Schedule (IMP/IMS). The IMP/IMS defines and schedules all tasks required to meet program level goals and includes the contractor and SPO. It is broken out into six major elements. The top three levels are managed by the Baseline Change Board. The lower levels are managed by individuals IPTs.

⁵³ ASC/YC, *Flexible Sustainment Annex to the C-17 Weapon System Single Acquisition Management Plan, Dated January 2002.*

⁵⁴ Performance Work Statement, CONTRACT F44650-95-D0002, Task Order 2413.

⁵⁵ ASC/YC, *Flexible Sustainment Annex to the C-17 Weapon System Single Acquisition Management Plan, Dated January 2002.* Updated Apr. 2003.

2. Financial Management Perspective

For the two weapon systems, the Financial Management Perspective section of the Sustainment Business Model will be used as a basis for conducting the study. The overarching financial management considerations of each weapon system are either program affordability and/or best value. In this examination of each weapon system, the focus is on providing greater detail on the manner in which the programs achieve affordability and best value. The analysis will also consider financial topics of interest that may prove beneficial to other weapon systems in structuring their financial management strategies supporting a long-term sustainment strategy.

a. *F-16 Falcon Financial Management Perspective*

According to the F-16 Single Acquisition Management Plan, the program has embraced the Reduction in Total Ownership Cost (R-TOC) concept, factoring it into each new acquisition decision. For the F-16 program and products, the overall contract cost risk is considered low to moderate. In determining the cost risk, as well as cost factors for estimating purposes, the SPO applies the concept of Cost as an Independent Variable (CAIV). In the programs most recent Product Support Management Plan (PSMP), the F-16 SPO described the way in which the geographically separated unit acts as a single entity to provide the product, the product being an affordable combat-ready aircraft. In the PSMP, the number one mission goal is to provide the warfighter with the most capable F-16 at the lowest cost. To accomplish this, the SPO is divided into four main organizational groups, one such group being the Business Group. The Business Group is further divided into three parts: Financial, Contracting and Personnel Management. ASC/YPF is the Financial Division at Wright-Patterson AFB, and is responsible for all USAF and Foreign Military Sales (FMS) financial matters. Similar functions fall under the Logistics Support Division (OO-ALC/YPL) organizational structure at Ogden-Air Logistic Center (OO-ALC).

In recent years, the F-16 SPO has used the Business Case Analysis (BCA) decision support to select providers based on best value and affordability. One aim of the BCA was to balance the workload between public and private sector sources. The

program believes the BCA is integral to selecting the highest quality goods and services, while at the same time delivering products quicker and at a lower price.

In the late 1990's, the program implemented a program called the Product Support Business Area (PSBA), as part of a management strategy to reduce costs. PSBA initiatives at the time were credited with over \$16.4 million⁵⁶ in cost reductions which alleviated Total Obligation Authority (TOA), making it possible to fund more modernization efforts. For depot level repairs, the program made contractor versus organic workload determinations through the Source of Repair Assignment Process (SORAP), and used Interim Contractor Support (ICS) for support items that were either time critical or had an unstable design. Additionally, the F-16 SPO used program schedules termed "F-16 Road Maps" as a means for documenting requirements for block upgrades. The SPO used these scheduled program requirements in constructing POM and FYDP submissions.

As a means to control costs the program established the Program Management Oversight of Life Cycle Support (PMOLCS) Plan, a precursor to the PSMP. Additionally, the program created a Cost Reduction Integrated Product Team (CRIPT), trained on the R-TOC concept, and tasked them with identifying cost drivers and securing funding for cost reduction initiatives. As a starting point, the F-16 established a cost baseline for the three major appropriations: Research Development Test & Evaluation (RDT&E), Procurement and Operation and Support (O&S). The F-16 SPO's overarching goals were to improve customers support and lower operating costs. In order to do so, the program needed to identify and understand the costs in the baseline. This R-TOC approach allowed the SPO to focus efforts on high cost drivers which were tracked to determine whether the cost reduction measures in these areas were successful. The SPO reported that the FY98 total O&S cost estimate had increased by \$837 million by FY01⁵⁷. One high cost driver, comprising 21% of the total O&S cost estimate, was the Depot Level Repairables (DLRs) which alone had increased by \$232 million. The SPO argued that whether efforts in R-TOC of O&S were to be successful would depend largely on the

⁵⁶ ASC/YP, *F-16 Multimission Fighter Program, Global Single Acquisition Management Plan (SAMP) Dated 2 March 1999.*

⁵⁷ ASC/YP, *Draft of F-16 System Program Office, Product Support Management Plan (PSMP).* 2002.

subsequent impact cost savings measures would have on potential Reliability, Maintainability and Supportability (RM&S) improvements. The SPO attributed the cost growth to increases in weapon system usage, and rising repair and replenishment spare prices. They further stated the aging weapon system platform and diminishing manufacturing source (DMS) as contributing factors to the cost growth.

b. C-17 Globemaster Financial Management Perspective

One of the four top-level C-17 goals is to lower life cycle costs. This goal is measured by monitoring the Acquisition Program Baseline at a summary level and individual contracts and support cost indicators. The program also purports to actively applying R-TOC initiatives in controlling program costs. The following descriptive analysis details some of the funding strategies used by the C-17 to keep the weapon system affordable and provide for best value.

Looking first at the decision support tools, one of the primary financial management tools used by the C-17 program to support the final long-term sustainment and Core workload recommendation was the Business Case Analysis (BCA). The SPO initially used a Cost Benefit Analysis (CBA) but discontinued its use due to being ill-suited for analyzing the sustainment effort in that it fostered an unhealthy competitive environment. In the C-17 BCA, the SPO documented the long-term sustainment direction and the supporting analysis, and also incorporated a performance-based partnership between the AF and Boeing. The objective of the partnership was to meet performance requirements, reduce costs, provide best value, and comply with Title 10 Core and 50/50 statutes. In the end, the BCA supported the Core workload recommendation, the TSSR designation and Direct Sales arrangement, but the most beneficial aspect of the BCA was that it served as a baseline for future cost and performance initiatives.

As for the cost estimating approach, in the early stages of the program, the C-17 SPO used a Joint Cost Model to provide a basis for assessing the impact of cost reduction initiative on all cost elements. For the long-term sustainment Program Office Estimate (POE), covering FY03 to 33, the program used the Operation and Support Cost Analysis Model (OSCAM) to provide a baseline in evaluating the contractor's cost

proposals. The POE was based on Boeing's January 2002 cost estimate for long-term sustainment and on historical Flexible Sustainment contract costs, and was to be modified to account for the public/private partnership arrangements.

In addition to serving as the basis for budgeting purposes, the POE also served as a foundation for the quantitative analysis for the BCA to ensure a fair and reasonable assessment was conducted. BCA cost alternatives were estimated at the Work Breakdown Structure (WBS) level. To accurately assess the costs over time, a Net Present Value (NPV) analysis was accomplished that discounted⁵⁸ the organic and Original Equipment Manufacturer (OEM) non-recurring investment costs, the Boeing Repair of Repairable (RoR) life cycle costs and the ALC RoR life cycle costs. For the NPV calculation, the Boeing cost estimate was used as the baseline, unless the partnered estimate came in as plus or minus 10% of the Boeing estimate, in which case the lowest estimate would be the preferred choice. Another unique feature of the BCA was that it used a streamlined SORAP to document the recurring costs for the organic Core workload. In calculating the organic costs, similar weapon systems were used as a basis for the cost estimate, and in the case of support equipment, price simulations were used to determine the costs.

An aspect of the funding strategy was to have Boeing Company operate under a Direct Sales Partnering Agreement (DSPA) with the three ALCs, HQ AFMC/LG and the C-17 SPO (ASC/YC) for the partnering and Core repair/maintenance workloads. Implementation Agreements were used between the ALCs and Boeing to transfer Core workload to the ALCs. Non-core repair/maintenance tasks would be subject to a Boeing "Best Value" determination⁵⁹. Funding for the initial Boeing Flexible Sustainment contract was approved in the President's Budget, and the funding line was adjusted after results of negotiated contracts. In standing-up capabilities at the ALCs, Core workload was to transfer once funding became available. Ten Implementation Teams (ITs) at the ALCs, supported by cost estimators and planners, determined the time-phasing for costs,

⁵⁸ For the NPV calculations, the C-17 SPO used the USAF discount rates published on the SAF/FMC web site.

⁵⁹ ASC/YC, *Flexible Sustainment Annex to the C-17 Weapon System Single Acquisition Management Plan*, Dated January 2002. Updated Apr. 2003.

estimated recurring and non-recurring cost, and evaluated cost, schedule and performance risks against performance metrics. A unique funding strategy negotiated by the program in the depot strategy was to have Boeing, over a five year period, invest \$62 million in the ALCs in exchange for a long-term Total System Support Responsibility (TSSR) performance arrangement⁶⁰. This was primarily for investments in capital equipment, tech data and manpower. This came at no cost increase to the Flexible Sustainment contract, which has since been renamed the "C-17 Globemaster III Sustainment Partnership" (GSP). Another funding strategy under this contract was the breaking out the F-117 Engines as Government Furnished Equipment (GFE). This direct contractual relationship with Pratt-Whitney was credited with lowering the acquisition cost by eliminating pass-through charges.

The C-17 Flexible Sustainment contract approach predominantly follows a firm fixed price strategy, alleviating the need for cost visibility in the contract. The Earned Value Management System was applied for time and material, cost plus and fixed price incentive contract line items. The award fees were tied to Boeing's performance to the Flexible Sustainment Aircraft Availability (FSAA) and customer satisfaction metrics. An approach taken by the program to accurately capture costs at each stage of the life cycle was to break out the product field support into a separate contract. This highlighted the true cost for the activity and added funding flexibility for the support elements.

One approach in particular that the program undertook to improve internal processes was the concept of Civil/Military Integration (CMI). Under the CMI concept, the program was designated as a pilot program for commercialization, applying the benefits of commercial and best-practice management. For the business areas, they conducted market research in applying commercial practices in the various business areas, which included Contract/Financing, Terms and Conditions, Pricing, Cost Performance Management, Cost Accounting, Property Management and Supplier Management. This was a team effort, comprised of representatives from the SPO, Defense Contract Management Agency (DCMA), Defense Contract Audit Agency (DCAA) and The Boeing Corporation. The research involved engaging government and

⁶⁰ Talking Paper on C-17 Long-Term Sustainment/Boeing ALC Investments.

industry experts on ways to achieve capabilities and improve manufacturing practices. Best practices were to be implemented in future contracts. The C-17 SPO recommended commercial practices in the following areas: Contracts & Financing, Terms and Conditions (Risk Areas), Pricing, Cost Performance Management and Cost Accounting⁶¹.

3. Contracting Perspective

Management of the contractual issues is an essential element of the support acquisition process that can lead to the long term success or failure of a support acquisition for a major weapon system. The Contracting Perspective of the Sustainment Business Model will be used as a framework to analyze the two weapon systems. The focus will be on the identification of tools, processes and procedures established and used by the respective SPO's to obtain the highest level of contractor performance at the best value for the government. This will be done by analyzing the program offices in their application of risk management, contract management and relational management with the contractor.

a. F-16 Falcon Contracting Perspective

(1) F-16 Risk Management. The Falcon 2020 support contract consists of a two pronged approach designed to identify both current and future risk associated with the sustainment effort of the F-16 weapon system. The initial approach consists of a government-only IPT within the SPO designed to identify, evaluate, and mitigate current risks associated with the processes and products inherent to the sustainment effort. Risks are identified as being of a cost, schedule or performance nature and a formal process is used to quantify these risks as being high, medium or low. For each risk identified, the program office has also outlined a risk mitigation plan. Risk assessment will also be required for future undefined orders. As such, the SPO owner for the requirement is expected to address any risk associated with their program and to formulate a risk management mitigation plan as part of the JRRT (Joint Requirements

⁶¹ ASC/YC, *Flexible Sustainment Annex to the C-17 Weapon System Single Acquisition Management Plan, Dated January 2002*. Updated Apr. 2003.

Review Team) process. Subsequent to the initial government only risk assessment, a formal Joint Risk Assessment is initiated for all future risk considerations in which the contractor is an active member of each IPT assigned for future requirements as well as being an active participant in the risk assessment process⁶².

(2) F-16 Contract Management. The Falcon 2020 follow on support contract is a continuation of the previous Falcon 2020 contract awarded to Lockheed Martin and is a broadly scoped, long term, sole source IDIQ contract. The initial Falcon 2020 contract had a period of performance of five years. Due to the essential requirement of continuous, non-interrupted, long-term support in order to preserve the combat capability of the weapon system, the length of the new contract is 23 years (1 March 2002 – 28 February 2025). The primary objective of the contract is to provide Post Production Support (PPS), Contractor Support (CS) services, specific Repair and Return support as well as additional engineering and sustainment services necessary for the continued operation and improvement of the F-16 weapon system.

According to the Falcon 2020 SAMP, the contract will consist of multiple pricing arrangements to include: FFP, CPFF, T & M, FPIF, CPIF, CPAF, and FPLOE. The JRRT (Joint Requirements Review Team) will recommend the most efficient pricing arrangement to be used for each delivery order in an effort to motivate contractor performance that is consistent with the overall contract objectives⁶³. Under the area of Cost & Performance Management, contractor performance is regularly measured through the application of CPAR (Contractor Performance Assessment Reporting System) evaluations for each individual delivery order over the life of the follow-on contract. Contractor performance for future requirements will be identified, defined, and measured in separate management plans that are applicable to these programs. Regular program reviews are held for evaluating all cost type arrangements on orders. These reviews are chaired by the F-16 SPD and SSM deputies and focus on contractor performance, including cost, schedule, and technical status. In addition, these

⁶² ASC/YP, *F-16 Multi-mission Fighter Program Global Single Acquisition Management Plan (SAMP)*, Dated 2 March 1999. Wright-Patterson AFB, Ohio.

⁶³ ALC/YP, *Single Acquisition Management Plan (SAMP) for the Falcon 2020 Follow-on, F-16 Global SAMP, Annex 029*, Dated 25 October 2001. Hill AFB, Utah.

reviews include the contractor's corrective action plans, along with any actions required by the government⁶⁴

(3) F-16 Relations Management. The Falcon 2020 support contract, executed and managed by an IPT, contains several initiatives and formal processes that facilitate a collaborative working relationship with the contractor Lockheed Martin; an integral part of the Falcon product team. One of the processes described in the SAMP involve the use of Periodic Technical Interchange Meeting (TIMs) and are held so that the IPT can discuss detailed definitions of requirements for the program. The SPO also has several acquisition reform initiatives such as the Joint Build Process in which the Falcon IPT members (SPO personnel from HAFB/WPAFB, Ogden ALC, DCMA/DCAA, and contractor personnel) worked collaboratively to develop the contract and determine predefined requirements. Another reform initiative is the implementation of the Early Strategy and Issues Sessions (ESIS) in which early strategy sessions were held with senior managers prior to the formal ASP (Acquisition Strategy Panel) briefing. The entire Falcon IPT, including the contractor, participated in the sessions in which many recommendations derived from those sessions were incorporated into the final ASP presentation.

The Business Relationship that the SPO has with the prime contractor is also described as collaborative in nature. The Falcon 2020 program manager has a Lockheed Martin counterpart that is involved in almost every aspect of all appropriate activities. Additionally, each predefined order has a SPO and a contractor owner who is responsible for the requirement definition and management throughout completion⁶⁵.

b. C-17 Globemaster Contracting Perspective

(1) C-17 Risk Management. The risk management approach employed by the C-17 SPO involves a robust and collaborative effort with the Boeing

⁶⁴ ASC/YP, *F-16 Multi-mission Fighter Program Global Single Acquisition Management Plan (SAMP)*, Dated 2 March 1999. Wright-Patterson AFB, Ohio.

⁶⁵ ALC/YP, *Single Acquisition Management Plan (SAMP) for the Falcon 2020 Follow-on, F-16 Global SAMP, Annex 029*, Dated 25 October 2001. Hill AFB, Utah.

Corporation (prime contractor) in which the risk management plan is performed using a shared data base. This risk management process, approved by the SPO and Boeing management, is based on the traditional Air Force risk assessment guide who assesses the likelihood and consequence of a particular event or item. The risk management team is composed of the SPO IPT's, DCMA personnel, and Boeing contract managers. Weekly telecons are chaired by the SPO Business and Integration IPT as well as the Boeing Analysis and Integration IPT and involves all organizational stakeholders. The shared data base is reviewed and discussed with any member of the team being allowed to propose candidate items. Items identified through the risk management process are classified as either "risks" or "issues"; where risks are potential problems and issues are conditions that have already occurred. The potential user then evaluates the risks associated with the identified item(s) and recommendations are discussed with a decision to be reached at the subsequent meeting. The status of the items identified from the shared data base is briefed on a monthly basis to both SPO and Boeing management via VTC⁶⁶.

(2) C-17 Contract Management. The original Flexible sustainment program is designed to satisfy the Government's goals of achieving improvements in logistics support and mission readiness as well as providing best value to the government. According to the SAMP, the SPO is expected to award a new sole source, Flexible Sustainment contract to the Boeing Company for the period of FY04 – 11. The contract type that the government and Boeing will negotiate is a Firm Fixed Price (FFP) contract with Award Fees.

The number of contract performance metrics was reduced from 15 on the original base contract to six. The new performance metrics are designed to focus contractor performance at the systems level as well as to give the contractor additional latitude to meet the C-17's operational requirements⁶⁷. The contracted metrics associated with the new sustainment effort will be similar to those identified in the previous flexible sustainment contract to include: FSAA (Flexible Sustainment Aircraft Availability)

⁶⁶ ASC/YC, *Flexible Sustainment Annex to the C-17 Weapon System Single Acquisition Management Plan, Dated January 2002*. Updated Apr. 2003.

⁶⁷ ASC/YC, *C-17 Weapon System Single Acquisition Management Plan, Dated January 2002*.

flying hours achievable, Mission Impaired Capability Awaiting Parts, Aircraft Depot Maintenance Scheduling Effectiveness, issue effectiveness, and customer satisfaction⁶⁸.

(3) C-17 Relations Management. The C-17 Flexible sustainment program includes specific formal processes designed to increase collaboration and early involvement by key stakeholders. In addition to formal support IPTs, there exist additional processes such as the Global Sustainment Partnerships (GSP) as well as collaborative contracting arrangements such as TSSR (Total Systems Support Responsibility). The FY04 – 11 Flexible Sustainment contract will have the C-17 SPD as the coordinator of the overall weapon system requirements with HQ AMC/XP through the jointly chaired “C-17 Requirements and Planning Council.” Boeing, however, is responsible for the overall sustainment of the C-17 aircraft fleet. The contractor and the SPO serve as co-leads for the various IPTs developed in support of the sustainment effort⁶⁹.

The Boeing Company also operates the sustainment contract under the TSSR concept in which they must agree to the provisions of the RFP which stated that the contractor shall “manage, direct, and control requirements and processes using an integrated product development and total weapon system level approach. The required outcome of TSSR shall be to achieve the specific operational performance measures within contract cost, schedule, and performance requirements, logistics and security. TSSR is a Product Support strategy whereby Boeing is responsible for system sustainment tasks and the integration of sustainment with production and modifications to meet AMC peacetime and wartime requirements”. The SAMP also explains that the TSSR approach will continue to be used by the program office as the long-term sustainment strategy while also increasing partnership opportunities with the ALCs for Core workloads.

The Global Sustainment Partnership (GSP) team was formed by the SPD to develop and implement partnerships between the Boeing Company and the Air Logistics Centers (ALCs). The GSP includes members from the C-17 SPO, the

⁶⁸ ASC/YC, *Flexible Sustainment Annex to the C-17 Weapon System Single Acquisition Management Plan, Dated January 2002*. Updated Apr. 2003.

⁶⁹ Ibid 68.

ALCs, HQ AFMC, HQ AMC and Boeing. The team reports progress and receives direction on sustainment and partnership efforts every 60 – 90 days from SAF/AQ and AF/IL. The Boeing Company will perform as the TSSR contractor with direction to partner with the ALCs for Core workload for the long-term sustainment of the C-17 weapon system.

The C-17 SPO also participates in the Public-Private Partnerships (PPP) in which the relationship would allow the prime contractor and the Government repair source (ALC) to enter into a traditional subcontract relationship if the Government source is determined by the prime contractor to be the best value source of repair. Major goals of the PPP approach include the ability to integrate and benefit from the mutual strengths of Government depots and private industry as well as to ensure TSSR for the prime contractor.⁷⁰

C. CONCLUSION

This chapter provided a description of the two weapon systems: The F-16 and C-17, and using the framework of the Sustainment Business Model, provided a descriptive analysis of the systems from a business community functional perspective. This included a descriptive analysis of reporting mechanisms, financial management and contracting approaches taken by the weapon systems as described in the SPO documentation. The next chapter will compare the literature review findings with the actual strategies undertaken by the weapon systems.

⁷⁰ ASC/YC, *Flexible Sustainment Annex to the C-17 Weapon System Single Acquisition Management Plan, Dated January 2002*. Updated Apr. 2003.

IV. COMPARATIVE ANALYSIS OF WEAPON SYSTEMS

The previous chapter provided a general description of the two weapon systems and examined, using documentation provided by the SPOs, a descriptive analysis of the business community approach to the operation and support strategy, applying the structure in the sustainment business model from Chapter 2. Taking the concepts from the literature review and the practical application as described in Chapter 3, the project team will conduct a comparative analysis of the F-16 and C-17 sustainment strategies as they relate to the concepts. For this analysis, the sustainment business model will be applied as a framework for comparing the sustainment approaches in following areas: Reporting Mechanisms, Financial Management Perspectives, and Contracting Perspectives.

A. REPORTING MECHANISMS

Using the findings from the literature review and the descriptive analysis section, this section will examine the similarities and differences in the two weapon systems that specifically concern Reporting Mechanisms. The Reporting Mechanisms comparative analysis will examine the structure and techniques used to manage the identification and control of requirements in order to provide the customer with the best value weapon system support for the F-16 Falcon and C-17 Globemaster programs as they relate to the concepts previously described.

1. Goals

As the literature review revealed, any DoD sustainment program must understand the requirement and importance of having clear lines of authority and Integrated Product Teams. In addition, programs must ensure that forums are used that foster open communication throughout the complicated web of the PPBE process to more effectively identify and control requirements in order to translate the requirements into adequate funding to support the warfighter's readiness objective. Through the use of different

forums, the process is hopefully managed more efficiently and effectively to provide the customer with the best value weapon system support.

2. Lines of Authority and Oversight Boards

The literature review identified the structure and lines of authority based on public law and DoD/Component regulations (Table 1). Hence, both the F-16 and C-17 programs have near identical reporting channels. Each program has a System Program Director and System Support Manager who report to respective PEOs. Quarterly and monthly reports which encompass updating information, schedule and other issues on each program is presented to the PEO.

As stated in the literature review, oversight boards and the forums they use, allow top management an overarching view on program status. Within each program, an assortment of oversight boards and forums at all levels of authority is used to enhance communication and decision-making. The F-16 program uses Technical Interchange Meetings (TIMS), a forum at the SSM level that is geographically separated from the SPD, to discuss detailed definitions of requirements. The C-17 program uses the Requirements and Planning Council to review requirements which involves both the SPD and SSM. However, not enough detailed information was provided by the SPOs to discussing FM personnel involvement in these forums in regards to building cost estimates, formulating budgets, or establishing contracts.

Current policy and future policy uncertainty plays a large role in controlling requirements. After the Defense Acquisition Board voiced concerns regarding the C-17 Depot Support Strategy, an economic assessment was conducted. At the time, the strategy was affected by several factors. In 1996, a General Officers Steering Group was formed and recommended continued use of Interim Contractor Support through the production phase. In 1998 the SPO implemented a Flexible Sustainment Program in which the AF could postpone determining the long-term sustainment strategy. Today, C-17 support continues under a Flexible Sustainment Concept which takes advantage of industry and organic support while maintaining core capabilities at the ALC. For the F-16 program, performance based logistics contracts ensure partnering on core workloads that provided for organic support, while allocating all other workloads. Allocation of “all

other” workloads is based on either government or contractor ability to meet requirements based on a best value determination. The use of these oversight boards and forums by the program offices will undoubtedly provide leadership at all levels the ability to enhance communication and decision-making capabilities.

3. Integrated Product Teams

As stated in the literature review, the use of IPTs is critical as they are made up of functional area experts, contractors and other key stakeholders. Both programs utilize a variety of IPTs derived not only from personnel from applicable internal functional areas, but also contractors and other external agencies with a vested interest in the outcome (Table 1). The F-16 SPO has utilized a variety of IPTs spanning back to the Falcon 2020 program. IPTs included the Hill Air Force Base Acquisition Support Team/Source Selection Expert Advisor coupled with the Headquarters Air Force Materiel Command Centralized Acquisition Support Team. These IPTs included representatives from Defense Contract Management Agency (DCMA) and Defense Contract Audit Agency (DCAA) who continue to be active participants along with representatives from the Deputy Under Secretary of Acquisition and a liaison from the PEO office. Currently, the Joint Requirements Review Team is the approving authority for adding sole-source requirements to the Falcon 2020 contract. The JRRT is a standing IPT that ensures competition is maximized due to the sole-source nature of the Falcon 2020 contract.⁷¹ To determine the best long-term strategy for the C-17 program, an overarching IPT called the Global Sustainment Partnership which is made up of “Gatekeepers,” formed to provide direction on sustainment and partnering. From information provided by the C-17 SPO, the financial management role is not clear, but the guidance provided by this steering committee likely drove programmatic and budgetary decisions.

According to the Reduction of Total Ownership Cost Best Practices Guide (Sept 2003) the DoD created the R-TOC Program in an effort to reduce total ownership costs (R-TOC). Both the F-16 and C-17 programs were chosen to pilot the new program among a total of 30 DoD Pilot Programs. At the top level, the R-TOC Working Group is

⁷¹ ASC/YC, *F-16 Global Single Acquisition Management Plan, Dated 19 September 2002.*

made up of key OSD functional organizations, the Defense Logistics Agency (DLA), and Service Staff. The Working Group meets on a quarterly basis to review all program progress, identify and resolve issues, and coordinate activities. At the operational level, the F-16 Program created a Cost Reduction Integrated Product Teams (CRIPTs) that identify and analyze various cost drivers to identify and secure funding for Cost Reduction Initiatives. The C-17 program developed a multiyear procurement strategy which includes performance based financing and a team approach with the Government, the contractor, and key suppliers, all working to develop a joint cost model to identify cost reduction opportunities. The Guide states that the results achieved include enhanced system reliability, better supply chain responsiveness, and improved logistics support.⁷²

Both the F-16 and C-17 Programs have made changes to IPTs in support of recent Acquisition Reform Initiatives. The C-17 SPO is organized now into IPTs with a similar structure used by the contractor. The IPT structure was changed after the Milestone IIIB decision which focused on production and support issues instead of Engineering & Manufacturing Development (EMD) issues. As such, the SPO is focused on managing the program while reducing manpower. The C-17 SPO IPT is made up of the user, DCMA, contractor and SPO personnel. The program also developed a strategy to contract for production, enhancement and support separately. This allowed the SPO to monitor actual costs and improves the ability and flexibility to support the program throughout its useful life.⁷³ Since the F-16 program is more mature, it has focused its reform efforts on consolidating requirements into one contract vehicle. The Falcon 2020 IPT is made of SPO personnel from HAFB and WPAFB, representatives from the DCMA, DCAA, and the contractor. The consolidated contract now incorporates both government and contractor defined requirements and pricing arrangements. As a result, the DoD now has a contract vehicle in place that meets the warfighter's needs and solidifies a long-term agreement between the government and contractor to support the F-

⁷² *A Systems Engineering Guidebook*, Office of Defense Systems, Under Secretary of Defense (Acquisition, Technology & Logistics), Sep. 2003.

⁷³ ASC/YC, *C-17 Weapon System Single Acquisition Management Plan, Dated January 2002*.

16 program.⁷⁴ The use of IPTs by program offices at the appropriate level will not only enhance communication and decision-making capabilities, but will also provide higher levels of leadership better “filtered” feedback.

⁷⁴ Retrieved from *AF Acquisition newsletter*; <https://www.safaq.hq.af.mil/news/aprilmay02/f16.cfm>
Apr./May 2005

	Lines of Authority & Oversight Boards	Integrated Product Teams
F-16	<ul style="list-style-type: none"> -Lines of authority are established IAW public law and DoD regulations -Technical Interchange Meetings (TIMS) to discuss detailed definitions of requirements -ROTC Working Group (made up of OSD functional orgs, Defense Logistics Agency, and Service Staff) used to review all program progress, identify and resolve issues, and coordinate activities on a quarterly basis 	<ul style="list-style-type: none"> -Falcon 2020 IPT (members of HAFB, WPAFB, DCAA, DCMA, contractors, DEPSECDEF/AQ) used to consolidate multiple contracts into one. -Joint Requirements Review Team (JRRT) is the approving authority for adding sole source requirements to Falcon 2020 contract. -Cost Reduction Integrated Product Team used to identify/resolve issues and coordinate activities (Reports directly to ROTC Working Group)
C-17	<ul style="list-style-type: none"> -Lines of authority are established IAW public law and DoD regulations -Requirements and Planning Council (R&PC) to review requirements -General Officers Steering Group used to recommend Contractor Support until long-term strategy determined -ROTC Working Group (made up of OSD functional orgs, Defense Logistics Agency, and Service Staff) used to review all program progress, identify and resolve issues, and coordinate activities on a quarterly basis 	<ul style="list-style-type: none"> -Also uses similar IPT as CRIPT to identify and resolve issues and coordinate activities (Reports directly to ROTC Working Group)-Global Sustainment Partnership (GSP) provides direction on sustainment and partnering -Supportability Operations Review Team and Crew Operations Review Team CORT and SORT are forums that review and prioritize improvements and changes to the weapons system (reports to R&PC)

Table 1 Summary of key Reporting Mechanisms within the F-16 and C-17 program offices.

B. FINANCIAL MANAGEMENT PERSPECTIVE

Using the findings from the literature review and the descriptive analysis of the weapon systems, this section will take a more in-depth look at the similarities and differences between theoretical concepts and practical application of these concepts. More specifically, the Financial Management Perspective comparative analysis will examine the financial related goals, decision support tools, cost estimating methodologies, and budget formulation and execution aspect of the F-16 Falcon and C-17 Globemaster weapon system programs as they relate to the theoretical concepts.

1. Goals

As the literature review revealed, the most important overarching financial concepts to consider in a program are Reduced Total Ownership Cost (R-TOC) and Cost as an Independent Variable (CAIV). Both programs are embracing the R-TOC and CAIV concepts to provide the customers with an affordable and/or best value weapon system support. The financial decision support tools, cost estimating techniques and budgetary strategies all focus on achieving the affordability and best value goals.

2. Decision Support Tools

In this affordability/best value strategy, one decision support tool common to and preferred by both programs is the Business Case Analysis (BCA). As stated in the literature review, the BCA has become a preferred decision support tool in the financial management community. The BCA has long been a requirement for SORAP determinations, but has recently been promoted by SAF/FM as a tool of choice to support the decision makers in making all enterprise-wide product support decisions. In the case of the F-16 program, the BCA is used for making all product support decisions, not only to keep costs down, but to also balance workload between public and private support providers. The C-17 applied the BCA to partnership objectives. For the partnership, the SPO identified the objectives as performance requirements, cost reduction, best value and complying with public law. The SPO further credited the BCA with supporting Core workload determination, the TSSR approach and the Direct Sales arrangement.

3. Cost Estimating Methodologies

From the literature review on the subject, cost estimates are an indispensable tool for making trade-off decisions. The challenging part of building a cost estimate comes in putting together a cost estimate which considers only the relevant costs that have a relationship to the operation and support function. As for cost estimating methodologies, the two weapon systems pursued a number of initiatives for controlling costs making trade-off decisions, though the approaches are difficult to compare. The F-16 SPO documentation tended to describe the cost initiatives in general terms, whereas the C-17 SPO documentation provided a more in-depth description of cost reduction measures. For instance, to lower program costs, the F-16 credited the Product Support Business Area (PSBA) strategy, SORAP workload determinations, an ICS extension for time critical or unstable design requirements, and “F-16 Road Map” schedules in constructing POM and FYDP submissions, but did not provide details on the cost methodologies that were used in each area. One of the F-16’s most recent cost savings approach was the Program Management Oversight of Life Cycle Support (PMOLCS) plan, a predecessor to the PSMP. A Cost Reduction Integrated Product Team (CRIPT) was created to focus on R-TOC efforts, specifically looking at improving reliability and maintainability, reducing supply chain response times and competitively sourcing product support.

As for the C-17 operation and support program, the SPO’s cost estimating methodology evolved from a program-wide Joint Cost Model to a more comprehensive and detailed cost model for the sustainment effort. The model, called the Operation and Support Cost Analysis Model (OSCAM), was jointly developed by the ASC Cost Analysis Staff and other SPOs. This model provided the program with a cost baseline for program cost estimates, budgetary trade-off decisions and contracting efforts. A modification of this approach was used in costing out the Core workload. The Core workload was calculated using a streamlined SORAP estimating approach which relied heavily on similar systems and price simulations for support equipment.

4. Budget Formulation and Execution

As discussed in the literature review, the fiscal environment has many constraints and challenges. Limited discretionary budgets and competing resources make budget formulation and execution a particularly uncertain process. In response to this uncertainty, DOD has turned to transformational, reengineering efforts and out-of-the-box thinking in a number of functional areas. An effort underway in the financial community has been to put more emphasis on the execution phase of the PPBE process. This effort has involved performance-based logistics, tying financial and non-financial metrics to performance, and also the building of long-term relationships with support providers. During the formulation and execution phase, both SPOs turned to performance-based initiatives and public/private partnerships to improve reliability and readiness. Additionally, the C-17 SPO turned to unique funding strategies to keep sustainment affordable. The F-16 Falcon used performance agreements with suppliers and shifted avionics upgrades to the contractor to reduce costs and improve readiness. The C-17 relied on a flexible sustainment contract as a means to minimize risk in depot-related workloads. The program's goal under this contract performance guarantees was to reduce operation and support cost by using management-based reliability analysis, investing in productivity improvement efforts and instituting partnering arrangements between industry and ALCs. For the partnering funding arrangement, the prime contractor, Boeing, operated under a Direct Sales Partnering Agreement with the ALCs. One unique funding approach used in this partnering arrangement was having Boeing, over a five year, period invest \$62 million in capital equipment, tech data and manpower. In return, the C-17 SPO granted Boeing Total System Support Responsibility (TSSR). The TSSR contracts were separated from the EMD and Production contracts, giving a true picture of total support costs and adding funding flexibility to this area. The contract was predominantly a firm-fixed price, which alleviated the need for cost visibility, and linked the award fees to performance metrics.

	Decision Support Tools	Cost Estimating Methodologies	Budget Formulation & Execution
F-16	<ul style="list-style-type: none"> - BCA used for making all product support decisions -- Goal: Keep costs down 	<ul style="list-style-type: none"> - PSBA strategy of lowering program costs; now using the PMOLCS (pre-PSMP) plan - Initiation of a CRIPT pilot to focus on R-TOC - Use of “F-16 Road Map” as basis for POM and FYDP submissions - ICS extension for time-critical or unstable design requirements - Use SORAP for workload determinations 	<ul style="list-style-type: none"> - Use of performance-based agreements with suppliers to reduce costs and improve readiness
C-17	<ul style="list-style-type: none"> - Extensive use of a BCA for enterprise-wide decisions --Goal: Determine “best value” 	<ul style="list-style-type: none"> - Early in program used a Joint Cost Model; later turned to OSCAM to establish a baseline -Use of “streamlined SORAP” for Core workloads - Extended ICS to allow time to develop a “best value” support strategy 	<ul style="list-style-type: none"> - Use of flexible sustainment contract performance guarantees & reliability analysis to reduce O&S cost risk - Focus on productivity improvement efforts - Extensive use of Partnering arrangements for Core/Non-Core workloads -- DSA and TSSR w/prime contractor - Boeing capital investment in ALCs

Table 2 Summary of key financial processes within the F-16 and C-17 program offices.

C. CONTRACTING PERSPECTIVE

As part of the literature review process, certain procedures in regard to contract management were determined to be critical to the chance of having a successful support arrangement with the contractor. This section will analyze the processes used by the program offices discussed in chapter three. A comparison of the success actions discussed in the literature review will be weighed against what the program offices instituted as described in chapter three. The comparison will focus on contract management, risk management and relations management.

1. Contract Management

A summary of the contract management literature review reveals that certain processes and procedures were necessary to increase the chance of a successful support acquisition process. These critical success practices can be summarized as: developing effective incentives to encourage contractor performance, developing metrics to evaluate contractor performance, and developing a plan to encourage competition for future requirements. An evaluation of each system program office will be completed in an effort to establish if these critical success practices were implemented.

a. Development of Incentive and Metrics

The development of incentives to encourage contractor performance and metrics to measure contractor performance are key elements in any successful contracting relationship. That being said, the F-16 support contract consists of multiple pricing arrangements including incentive fee and award fee provisions. Due to the twenty year length of the support contract however, it seems reasonable that both award fee and incentive fee provisions should play heavily in the structuring of the contract so as to prevent significant cost increases as well as to maintain a high level of contractor performance. This is slightly dissimilar to the C-17 strategy in which the contract type is planned to be a FFP with award fee provisions tied to metrics such as the FSAA and customer satisfaction metric. This plan is designed to focus on contractor performance throughout the relative short eight year performance period.

Based on the data used in the evaluations, both weapon systems do adequate jobs of establishing the award/incentive fee provision appropriately to focus attention on cost contractor performance and/or cost savings. Conversely however, with the exception of the F-16 CPAR evaluation, neither weapon system program offices provide evidence of consequences for contractor non-compliance nor is there any evidence of an exit strategy which is important given the long performance periods of these contracts.

b. Development of Future Competition Opportunities

The literature review discusses the recommendation that every effort should be made to competitively source PBL contracts so as to facilitate a process that encourages price reductions. However, due to the tremendous scope of the requirement and the nature of the work, both program offices awarded the sustainment contract under a sole source arrangement. The F-16 SPO in particular, has an unusually long contract performance period of twenty three years. This shifts the leverage of the relationship to the contractor so it remains essential that the program office be proactive and attentive to future competition opportunities and to inject procedures into the process that may facilitate these opportunities. The F-16 has an arrangement in which the prime contractor (Lockheed Martin) participates in the DoD wide small business and disadvantaged business contracting program. As such, the prime contractor's small business goals are reviewed at the DoD level for compliance. This level of governmental oversight as well as the use of an ID/IQ contracting vehicle, will allow greater opportunities for competition among small and disadvantaged companies for current and future requirements⁷⁵.

Although the C-17 sustainment contract length of eight years is considerably shorter than that of the F-16, future competition requirements still remain an issue in the form of the allocating core capabilities to the ALCs. Even though Boeing has entered into a Direct Sales Partnering Agreement with the three ALCs for the partnering of core work loads (maintenance and repair tasks), Boeing still maintains significant

⁷⁵ ASC/YP, *F-16 Multimission Fighter Program, Global Single Acquisition Management Plan (SAMP)*, Dated 2 March 1999.

leverage in that C-17 unique repair/maintenance tasks that are subjected to a Boeing “best value” determination when deciding whether the task will remain with Boeing or be transferred to the ALC⁷⁶.

Again, due to the sole source characteristics of both weapon system support contracts, the contractor seems to have the leverage in terms of determining future competition opportunities. The government, however, injects tools into the process that facilitate opportunities for future subcontracting opportunities.

2. Risk Management

The focus of the literature review on risk management discusses the importance of determining price reasonableness as well as establishing tools and processes for the early identification of schedule and performance risks. The literature review goes on to discuss how the establishment of IPTs and the use of government support agencies such as DCMA and DCAA can facilitate the risk identification process.

Both program offices have extensive risk management plans that involve the establishment of risk IPTs. The F-16 program office separates itself from the C-17 with the establishment of the traditional government only risk IPT that identifies cost, schedule and performance as well as the Joint Risk Assessment in which the contractor is actively involved to assist in the identification of future risks. The risk management approach employed by the C-17 program office employs the use of DCMA and Boeing contract managers and involves the use of a dual data base to manage risks. This non-traditional risk management approach involves weekly telecons between the government and contractor IPTs with monthly updates to the SPO and Boeing management.

3. Relations Management

The literature review identifies one central theme as a critical success factor regarding contractor relations management; the implementation of IPTs early in the support acquisition process. Both weapon system program offices have multiple formal processes designed to increase collaboration and early involvement by the contractor as

⁷⁶ ASC/YC, *Flexible Sustainment Annex to the C-17 Weapon System Single Acquisition Management Plan*, Dated January 2002. Updated Apr. 2003.

well as additional key stakeholders. These processes go beyond the traditional IPTs in that the F-16 program office has several additional reform initiatives such as the previously discussed Early Strategy and Issues Session (ESIS) and the Periodic Technical Interchange Meetings (TIMs). The C-17 also goes above and beyond the use of traditional IPTs, with the establishment of the Global Sustainment Partnership (GSP) as well as implementing the use of the TSSR contractual arrangement; which characterized itself on the collaboration by both parties.

	Managing the Contract	Managing the Relationship	Managing the Risk
F-16	<ul style="list-style-type: none"> -Multiple pricing arrangements w/ award and incentive fee provisions -Formal program reviews for all cost type arrangements -Contractor performance is measured through application of CPARs 	<ul style="list-style-type: none"> -Formal processes that facilitate collaborative relationship with contractor <ul style="list-style-type: none"> --TIMs --ESIS 	<ul style="list-style-type: none"> -Formal risk assessment IPT for current and future requirements --Joint effort with prime contractor to reduce overall risk
C-17	<ul style="list-style-type: none"> -FFP contract type with award fee provisions -Established metrics to measure contractor performance 	<ul style="list-style-type: none"> -Formal processes that facilitate collaborative relationship with contractor <ul style="list-style-type: none"> --GSP --TSSR --PPP 	<ul style="list-style-type: none"> -Shared data base with prime contractor for risk identification -- Joint effort with prime contractor to reduce overall risk

Table 3 Summary of key contracting processes within the F-16 and C-17 program offices.

D. CONCLUSION

This chapter revealed the manner in which the weapon systems have applied the concepts from the literature review in the operational environment. Both weapon systems have applied many of the concepts though in some cases have taken different strategic approaches. The reporting mechanisms were found to be very similar for both programs due in large part to the formalization of the process under PPBE. In the financial management area, both programs followed the same overarching concepts in order to keep the programs affordable, and applied many of the same funding tools and strategies though to different degrees, likely due to the different maturity levels of the systems. As for the contracting approach, the weapon systems followed similar processes and procedures to incentivize and control contractor performance, and foster competition, all the while mindful of program risk and relationship building.

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V. GOOD PRACTICES/RECOMMENDATIONS

As discussed in the literature review, the objective of this research project was to examine critical sustainment program characteristics from the business community perspective for applicability in future weapon system sustainment efforts. Research was guided toward the identification of critical business community practices that are necessary to ensure the successful implementation of a long-term sustainment strategy. The intent of this chapter is to identify good practices incorporated by the program offices in their pursuit to developing more efficient processes for major weapon system support acquisitions. Additionally, the researchers will identify recommendations as to areas of focus that may contribute to the overall success of support acquisitions for major weapon systems.

It should be noted that only two weapon system program offices were included in this research study. This fact prevents the researchers from concluding that the identified good practices developed by the respective program offices can be generalized as best practices for all similar support acquisitions. The researchers do contend however, that the identification of good practices from the C-17 and F-16 program offices will provide a useful baseline of data in support of similar support acquisitions for major weapon systems.

A. REPORTING MECHANISMS

1. Good Practices

For any process within a sustainment program, involving key stakeholders is critical. SPOs must ensure involvement of these stakeholders at critical points throughout the processes. During the definition of the Falcon 2020 program, the SPO relied heavily on key stakeholder involvement including the contractor throughout the finalization of the Acquisition Strategy Plan. The Falcon 2020 SPO IPT consisted of members of both Hill AFB and WPAFB, representatives from DCMA and DCAA, and the contractor. DCMA is an independent combat support agency within the DoD, and

serves as the Department's contract manager. The importance of the SPO involving DCMA early-on is that they are responsible for ensuring that all Federal acquisition programs, supplies, and services are delivered on time, within cost, and meet predetermined performance parameters.⁷⁷ DCAA, under the authority, direction, and control of the Under Secretary of Defense (Comptroller), is responsible for performing all contract audits for the DoD. The importance of the SPO involving DCAA early on is that they are responsible for providing financial and accounting advisory services regarding contracts and subcontracts to all Components responsible for procurement and contract administration.⁷⁸ It goes without saying that involvement of the contractor is vital. After all, they will be accomplishing certain workloads for which DoD must explicitly communicate any minimal performance parameters to the contractor. The same goes for involvement of the warfighter (MAJCOM). Warfighter involvement during the requirements identification is critical to ensure the SPOs and other key players understand specifically, *what* the requirement is from the warfighter's perspective. To ensure this is done, logisticians must be involved as early as possible in the acquisition process.

Good practices within the F-16 and C-17 program were apparent in the operational product support and the R-TOC initiatives. Both programs have taken on certain initiatives in order to ensure improvement of system support while emphasizing efforts to reduce costs by involving key stakeholders within IPTs and processes.

The F-16 SPO for instance formed the F-16 Cost Reduction Integrated Product Team, providing specific training in R-TOC at the operational level. While exploring the potential for international collaboration to support TOC reduction initiatives for the overarching-program, the SPO has implemented two product support improvement initiatives. The first is a system of Service-Level Agreements and Government Performance Assessment Reports for improving supply support. The second, Combined

⁷⁷ DCMA website. Retrieved from <http://www.dcmamil> Nov. 2005.

⁷⁸ DCAA website. Retrieved from <http://www.dcaamil> Nov. 2005.

Life-Time Support program, is a prototype public and private partnering strategy to enhance overall product support to the warfighter.⁷⁹

The C-17 SPO likewise has displayed the benefits of IPTs and early involvement of all stakeholders. While developing its Depot Support Strategy (DSS), the program was faced with strategic uncertainties as depicted in an economic analysis assessment. As a result the DSS General Officers Steering Group was involved in the strategic direction. The over-arching IPT provided vital feedback and direction for the program amidst policy uncertainty relating to Base Realignment and Closure, the privatization of San Antonio Air Logistics Center and potential legislative changes to the 50/50 work share rule. The Group recommended Interim Contractor Support (ICS) continuation throughout production buying the program more time to determine a best value long-term sustainment strategy.⁸⁰ In the ICS phase, the program was able to identify and fully understand requirements and cost estimates in the contract. This has long-term implications on supportability because the SPO has cost visibility with cost-plus type contracts in the ICS phase. The SPO loses that visibility once the program uses or converts to a Firm Fixed price contract. Additionally, the SPO created an overarching-IPT called the Requirements & Planning Council (R&PC) which relies on inputs from the operational IPTs called Supportability Operations Review Team and Crew Operations Review Team. The CORT and SORT are forums that review and prioritize improvements and changes to the weapons system. In the cost reduction arena, the C-17 program developed a multiyear procurement strategy which includes performance based financing and a team approach with the Government, the contractor, and key suppliers, all working to develop a joint cost model to identify cost reduction opportunities. The results achieved include enhanced system reliability, better supply chain responsiveness, and improved logistics support.⁸¹

⁷⁹ "Pilot Programs to Reduce Total Ownership Costs," Retrieved from <http://ve.ida.org/rtoc/open/pilots/f16.html> Nov 2005.

⁸⁰ ASC/YC. *Flexible Sustainment Annex to the C-17 Weapon System Single Acquisition Management Plan, Dated January 2002*. Updated Apr. 2003.

⁸¹ *A Systems Engineering Guidebook*, Office of Defense Systems, Under Secretary of Defense (Acquisition, Technology & Logistics), Sep. 2003.

2. Recommendations

All SPOs face a daunting challenge in identifying and controlling requirements. Collaboration and communication with all stakeholders has to be clear, open and honest. Careful consideration should be taken when selecting IPT members not only to ensure the right mix of people is involved, but also to ensure people focus on solutions, not just the problem. IPT members should consist of experienced personnel in their functional areas, but must also understand the roles of other functional areas. Regardless of an IPT member's experience, each individual must be trained in areas such as introductory IPT courses, functional area courses, and team dynamics.⁸²

Forums at all levels to promote good communication and control requirements are also a must. Just as operational bases hold Financial Working Groups and Financial Management Boards to communicate vital FM strategies, status of funds and FINPLANS with key stakeholders, so too is the need and importance for the SPO and their key stakeholders to use forums that include key stakeholders in the business process. Early in the operation and support phase, the SPOs must be especially concerned with communication in an EVMS IBR. In this forum, it is important to fully understand the cost drivers in a contractor's work effort and to document them for future reference. This documentation will be vital later in the operation and support phase when cost visibility becomes limited under a firm fixed price environment. If necessary, to keep lines of communication open, a program should consider extending a cost-plus contract to ensure the costs are fully understood and documented before pursuing a firm fixed price contract.

Now turning to the different places in which to influence the processes, using a model such as the Cybernetic Feedback Model discussed in Chapter 2 (refer to Figure 7), managers gather information and choose among the three categories (inputs, processes, and outputs) to determine *where* to devote their attention to ensure that outputs are matched to the overall strategy and are adequately funded. Managements' attention needs to be focused on all three areas. The research project team advocates controlling the

⁸² MN3331 Principles of Systems Acquisition and Program Management Course, Subject: Integrated Product and Process Development, Slide 11.

process at the inputs and process portions of the chain; clear lines of authority, well thought-out development and training of IPTs at the critical level, and routine forums that foster open, honest and trustworthy communication. Ultimately the manager, working under time constraints, must determine where to focus their attention. Once outputs are compared to predetermined standards, accurate, reliable and timely feedback is then needed to alter inputs and/or processes to realign outputs with performance standards. Though the research project team advocates for improvement in lines of authority, functional specific training and communication, each program must consider unique aspects of their particular program that must be addressed to ensure the warfighter's objectives are successfully met.

B. FINANCIAL MANAGEMENT

1. Good Practices

A host of good practices were identified in the financial management area. The good practices were in the area of cost estimating, budget formulation/execution and overarching funding strategies.

One decision support tool effectively used by both the C-17 and F-16 was the Business Case Analysis (BCA). The C-17 used BCAs early in the sustainment phase, and the F-16 demonstrated its usefulness throughout the sustainment process. As a measure to further improve relevancy, accuracy and timeliness of financial information, SAF/FM has provided guidance to standardize and improve the application of BCAs to enterprise-wide decisions.

One notable cost estimating tool used by the C-17 program was the application of an adaptive cost model called the Operation and Support Cost Analysis Model (OSCAM). OSCAM was used to calculate and evaluate contractor operation and support cost estimates which provided a basis for trade-off decisions. The model shows potential for wider applicability to other programs. The model also employed a Data Management Tool (DMT) to assist the program manager and financial manager identifying and bounding requirements to ease the translation of the requirement into in a work breakdown structured cost estimate.

As for funding strategies, both programs leveraged capabilities of industry and organic providers to provide a best value approach to sustainment support. The F-16, even though it is a mature program with extensive organic support, used a partnering strategy to reduce risk and improve performance. In the case of the C-17, the program extended Interim Contractor Support (ICS) during the early sustainment phase to allow for time to build a better long-term sustainment strategy. Eventually, the program settled on a Total System Support Responsibility (TSSR) partnering relationship with Boeing that included a Direct Sales arrangement with the Air Logistic Centers (ALCs) which included Boeing capital expenditure investments in the ALCs.

2. Recommendations

For all weapon systems, the financial management community should start addressing the long-term sustainment strategy as early as possible in the acquisition process, no later than the System Development & Demonstration phase. All throughout the sustainment strategy, the financial managers must rely heavily on the logistic community to clearly define the requirement in order to cost out and budget for this requirement. The best approach to take is to have the SPOs involve all key logistic stakeholders early in the process. The key stakeholders include the prime contractor, ALCs, Major Commands (MAJCOMs) and a contingent of base-level end-users. Part of the strategy should address the good practices mentioned in the previous section, but should also keep in mind statutory requirements mentioned in the literature review, a “best value” partnering mix between industry and organic providers, and of course, include the concepts of Cost as an Independent Variable (CAIV) and Reduction in Total Ownership Cost (R-TOC).

C. CONTRACTING

1. Good Practices

This section will identify good practices as well as to issue recommendations for improving the support acquisition process. That said, the good practice emerging from the F-16 program office is identified as the concurrent and early use of acquisition reform

initiatives such as the Joint Build Process and the Early Strategies and Issues Session (ESIS) process. Also used is the Span Time of Acquisition Reduction (STAR) process for developing and finalizing proposals for task/delivery order requirements⁸³. The key to all of these processes is early contractor involvement throughout the initial stages of the requirements generation and contract development phases. Additionally, these processes have been instrumental to the rapid identification of risks as well as the development of procedures to mitigate future risks.

By using these acquisition reform initiatives concurrently and early in the support acquisition process, there were very few unknowns throughout the requirements definition and contract development stages; arguably the most critical portion of the process. Early collaboration facilitated by these initiatives allowed for greater upfront trust from contractor and government IPTs and allowed both stakeholders to leverage best practices and efficient processes.

Although not specifically identified as such, both the F-16 and C-17 program offices use the same general approaches, processes, and procedures characterized by the Alpha Acquisition concept. Alpha Acquisition is the framework for expediting both goods and services in the acquisition process⁸⁴ and can be defined as Alpha Contracting in which the government team meets with the corresponding contractor team prior to negotiation to consider where cost differences and technical misunderstandings exists⁸⁵. This is easily identified by the program offices by their use of multiple IPT's not only with contractor involvement but also with government support agencies such as DCAA and DCMA. The common goal of Alpha Acquisition is to acquire goods and services for the government at a fair and reasonable price⁸⁶. That being said, the respective program offices use of specialized processes that involve the IPT's (i.e. TIMs and ESIS) as well as

⁸³ ALC/YP, *Single Acquisition Management Plan (SAMP) for the Falcon 2020 Follow-on, F-16 Global SAMP Annex 029 Dated 25 October, 2001*. Hill AFB, Utah.

⁸⁴ Naval Air Warfare Center (4 March 2002), Alpha Acquisition Overview The Government and the Contractor Working Together. Retrieved from <http://www.ntsc.navy.mil/Ressources/Library/Acqguide/alphaprt.htm> Nov. 2005.

⁸⁵ Abacus Contract Management Definitions. www.abacuscm.com/glossary Oct. 2005.

⁸⁶ Naval Air Warfare Center (4 March 2002), Alpha Acquisition Overview The Government and the Contractor Working Together. Retrieved from <http://www.ntsc.navy.mil/Ressources/Library/Acqguide/alphaprt.htm> Nov. 2005.

the joint risk assessment process serve to contribute to the overall objective of obtaining fair and reasonable prices for the government. Furthermore, the earlier requirements are defined, risks identified, and formal partnerships developed, then the greater the potential to obtain price reasonableness.

As evidenced by the actions of both the C-17 and F-16 program offices, the early involvement by government support agencies is also a key element to Alpha Acquisition success. Early involvement by DCAA personnel can result in the more immediate use of proposed rate recommendations as opposed to the later utilization of rates when significant updated changes may have occurred. DCMA also benefits the process by their ability to perform one review rather than multiple reviews resulting from contractor proposal updates. Additionally, the contractor also benefits by substantially reducing its proposal preparation costs⁸⁷.

2. Recommendations

Given the long term nature of the C-17 and F-16 support contracts (8 years and 23 years respectively), as well as the sole source nature of these contracts, significant risks to the government exists. This necessitates an Exit Strategy so that these associated risks can be mitigated. Both of the program offices may have benefited by the establishment of a formal Exit Strategy in the event that the initial arrangement fails due to excessive costs or contractor non-compliance. According to a GAO report, the inability to obtain sufficient rights to technical data could limit the long term support options by program offices in the event that the original arrangement fails. The report goes on to recommend that program offices develop acquisition strategies that call for the delivery of sufficient technical data so that an alternate source can be selected if deemed necessary.

The DoD previously required program managers to ensure access to technical data in previous editions of the DoD Regulation 5000.2 –R but the requirement was rescinded in 2002. Beginning with the next iterations of the DoD 5000.1 and 5000.2

⁸⁷ Naval Air Warfare Center (4 March 2002), Alpha Acquisition Overview The Government and the Contractor Working Together. Retrieved from <http://www.ntsc.navy.mil/Ressources/Library/Acqguide/alphaprt.htm> Nov. 2005.

series, the DoD will require program managers to establish a management strategy that will again require access to the minimum data necessary to sustain the fielded system. For PBL arrangements, this will include acquiring the technical data needed to support an Exit Strategy should the primary arrangement become a non viable option due to excessive costs or inadequate contractor performance.⁸⁸

D. CONCLUSION

The objective of this research project was to examine the critical sustainment program characteristics from a business community perspective for applicability in future weapon system sustainment efforts. By developing a business model that focuses on the financial management and contracting functional communities, the researchers were able to provide an examination of the critical business success factors with the ultimate goal being the identification of the critical business community efforts that are necessary to ensure the successful implementation of a long-term support acquisition sustainment strategy.

The increased shift toward support acquisition services has given rise to new tools, processes and techniques that need to be implemented in order to give the government and contractor the best opportunities for success. This will involve the use of sound business judgments by all functional disciplines associated with the support acquisition process. With the establishment and use of official policies and procedures that encourage jointness, collaboration, and early involvement by key stakeholders, the support acquisition process can evolve into becoming an efficient process in which substantial benefits are gained by the government and contractor.

⁸⁸ Government Accountability Office, *Defense Management: Opportunities to Enhance the Implementation of Performance-Based Logistics* 16 August 2004 (GAO-04-715).

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